DOCUMENT RESUME

ED 052 124	24	SO 001 593

AUTHOR	Massialas, Byron G.; And Others
TITLE	Structure and Process of Inquiry into Social Issues in Secondary Schools. Volume 3, Social Issues Classroom Discourse: A Study of Expository, Inquiry Non-Probing Inquiry Probing Classes.
INSTITUTION	Michigan Univ., Ann Arbor.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C.
BUREAU NO	BR-6-1678
PUB DATE	70
CONTRACT	OEC-3-7-061678-2942
NOTE	217p.
EDRS PRICE	EDRS Price MF-$0.65 HC-$9.87
DESCRIPTORS	*Classroom Communication, Classroom Observation Techniques, Classroom Research, Cognitive Processes, Critical Thinking, *Discussion (Teaching Technique), *Inquiry Training, *Interaction Process Analysis, Models, Secondary Grades, Social Problems, *Social Studies, Student Attitudes, Student Behavior, Teacher Behavior, Teaching Styles, Verbal Communication
IDENTIFIERS	*Michigan Social Issues Cognitive Category System, Michigan Social Issues Project

ABSTRACT

The central concern of this study, which was briefly reviewed in ED 049 143, was to determine effective teaching strategies and practices in secondary social studies classroom discussions of social issues. Teaching effectiveness was evaluated in terms of the cognitive or critical thinking skills of participating students, and their attitudes toward the teacher and class. Incidently, the affective side effects of social issues instruction are reported separately in ED 039 162. In the initial analysis of two audio-taping sessions for each of sixteen classes it became apparent that distinct discussion styles existed: 1) expository, sharing background information only; 2) inquiry-nonprobing, giving hypotheses, opinions, and taking positions only; and, 3) inquiry-probing, developing ideas as well as devoting much time to defining, clarifying, evidencing, or testing these ideas. The instruments used for ascertaining the students critical thinking skills were the Michigan Social Issues Cognitive Category System, developed by the project as reported in ED 039 161, and the Harvard Social Issues Analysis Test; to determine student attitudes, the Minnesota Student Attitude Inventory was used. Students in the probing classes rated their classes highest and did very well on the critical thinking test; the expository classes came next, followed by the nonprobing classes with the lowest ratings and test scores. (Author/SBE)

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STRUCTURE AND PROCESS OF INQUIRY INTO SOCIAL ISSUES IN SECONDARY SCHOOLS

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ASSISTANT DIRECTORS
1970

VOLUME III

SOCIAL ISSUES CLASSROOM DISCOURSE: A STUDY OF EXPOSITORY, INQUIRY-NONPROBING INQUIRY-PROBING CLASSES

BY
NANCY FREITAG SPRAGUE

The research reported herein was performed pursuant to contract OEC3-7-061678-2942 with the United States Department of Health, Education, and Welfare, Office of Education.

ED052124

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STRUCTURE AND PROCESS OF INQUIRY INTO SOCIAL ISSUES IN SECONDARY SCHOOLS

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1970

VOLUME III

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SO 001 593

ED025154

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CHAPTER I

INTRODUCTION

This study was part of an intensive examination of the teaching of social issues in Michigan secondary classrooms carried out by the staff of the "Inquiry Into Social Issues Project". The main purposes of the larger project were to determine the status of social issues instruction in Michigan secondary schools, and to develop a category system which would enable both teachers and researchers to analyze classroom verbal interaction centering on social issues.[1]

The central concern of the study reported here is to determine effective teaching strategies and practices in classroom discussion of social issues. The study is particularly concerned with identifying characteristics of classroom dialogue which are associated with the reflective examination of social issues.

"Teaching for Reflective Thinking" has been discussed as a goal of social studies instruction ever since John Dewey defined reflective thinking as the "active, persistent, and careful consideration of any belief or supposed form of knowledge in light of the grounds that support it and the further conclusions to which it tends".[2] It is only in recent years, though, that a growing number of educators have made a concerted effort to develop and define a theory of instruction which takes as its central concern reflective or critical thought. Drawing upon the philosophy of Dewey, Bruner, and others these educators proposed a theory of instruction known as "inquiry" or "discovery". This instructional theory is based upon field psychology theories of learning which emphasize meaningful concepts rather than mechanistic connections. Field theorists conceive of learning as the discovery of meaning and as characterized by problem-solving where previously gained insights can be applied and tested in relation to an indeterminate problem situation.[3] Thus, inquiry instruction minimizes the importance of memorizing examined facts, concepts, and principles, and stresses the importance of experiences which involve examining testable propositions concerning knowledge or problems and arriving at warranted conclusions.

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[1] "Inquiry Into Social Issues" is the shortened title of the project, Structure and Process of Inquiry Into Social Issues in Secondary Schools. Byron G. Massialas, director and principal investigator, with Nancy Freitag Sprague and Jo Ann Cutler Sweeney, associate directors. (Project performed pursuant to contract OEC3-7061678-2942 with the United States Department of Health, Education, and Welfare, Office of Education, 1970).

Support for the "inquiry" or "discovery" method of instruction comes from two different, but complementary, social studies curriculum perspectives: the social science perspective and the social issues perspective. Bruner is perhaps the most effective spokesman for the first group of theorists. He argues the need for students to inquire as social scientists in order to understand the structure, organizing principles, and analytical tools of a discipline. From this point of view the curriculum should be organized around the structure of the disciplines. Students, instead of simply memorizing facts and concepts, should meaningfully participate in discovering, verifying, and structuring knowledge.[4]

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[2] John Dewey, How We Think (Boston: D.C. Heath, 1933), p. 9.

[3] Byron G. Massialas, Benjamin C. Cox, Jack E. Cousins, and Robert T. Elsmere, The Indiana Experiments in Inquiry: Social Studies (Bloomington, Indiana: School of Education, University of Indiana, 1963), pp. 1, 74-75.

The social issues curriculum perspective, on the other hand, argues that a major portion of the social studies curriculum should be devoted to the examination of social issues. In the opinion of these theorists, a central concern of the social studies should be the development of citizens who can make informed, rational decisions in society at large. Hunt and Metcalf state the position clearly: "The foremost aim of instruction in high school social studies is to help students reflectively examine issues in the problematic areas of American culture".[5] From this perspective, students focus upon and define social problems, offer hypotheses regarding possible solutions and courses of action, and then judge the defensibility of their hypotheses on the basis of factual evidence, value assumptions, and logical consequences.

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[4] See Jerome S. Bruner, The Process of Education (New York: Vintage Books, Random House), 1960.

[5] Maurice P. Hunt and Lawrence E. Metcalf, Teaching High School Social Studies (Revised Edition, New York: Harper & Row), 1968.

Instruction, by its very nature, is carried out through the medium of classroom verbal interaction. Both the social science and social issues curriculum proponents recognize this, and, thus, emphasize the importance in inquiry-oriented classroom discussions as opposed to discussions carried out in the traditional expository mode. In expository discussions, the teacher and students share and expound their knowledge of a given issue or topic. Generally, the teacher controls the information which is to be discussed. He sets the framework of the discussion and calls upon students to fill in the sequence of information which he, as the teacher, wishes to develop in class. Although students occasionally reorganize and apply knowledge to a new situation, they more often are asked simply to repeat or paraphrase what the teacher or text has said. Inquiry discussions differ from expository discussions in that the teacher and students do more than remember information; they are also actively involved in processes of search -- defining problems, categorizing data, hypothesizing, taking positions, synthesizing evidence, defending positions, and testing or validating hypotheses. Here emphasis is not only upon knowledge provided by the teacher or text, but on the process by which one arrives finally at a defensible decision or conclusion about the topic or problem under consideration.

Advocates of the inquiry method of instruction argue that students who regularly engage in this mode of instruction will make more gains in critical thinking skills than students who regularly participate in the expository mode of instruction.

A significant series of studies which tested this hypothesis were the Indiana Experiments in Inquiry. In these studies the researchers formulated a model of reflective inquiry instruction, operationalized the student-teacher behavioral components, and carefully defined what they meant by critical thinking. Cox experimented with inquiry methods in teaching Junior High U.S. History, while Massialas focused on the use of inquiry instruction in teaching High School World History. In each study, the investigator contrasted two groups of students - the experimental group was exposed to a reflective method of instruction while the control group received the traditional expository instruction. The results of both studies indicate that, in contrast to the control group, the students instructed in a reflective mode made statistically significant gains in critical thinking skills and achieved as well as the control group in the acquisition of facts.[6]

STATEMENT OF THE PROBLEM

Outside of the Indiana experiments, though, little research in the social studies investigates the effect of inquiry instruction on students attitudes or critical thinking skills. The research which does exist relative to student's critical thinking skills reports mixed findings regarding the impact of inquiry instruction. The difficulty with most studies in this area is that they do not adequately examine or control the crucial element in inquiry instruction--the classroom dialogue. Frequently these studies are simply testing whether the presence of inquiry materials or the presence of a teacher who says he uses inquiry techniques is related to the development of critical thinking. Inquiry materials may be available but that does not insure that the teacher and students effectively utilize them to engage in inquiry discussion. A teacher may say that he uses and supports inquiry instruction, but it does not necessarily follow that he actually implements it in class discussion. Unfortunately, not all discussion classified by researchers as inquiry are reflective in nature. A teacher may be indirect and allow students to hypothesize about problems, but no attempt is made by the students or teacher to defend or probe their hypotheses. This type of discussion is neither expository nor reflective in nature. Perhaps it could be classified as nonprobing inquiry.

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[6] Byron G. Massialas, and others, The Indiana Experiements in Inquiry: Social Studies.

The teacher who wishes to promote inquiry dialogue in his classroom also frequently encounters difficulties. Although he may know Dewey's five steps of reflective thought or be aware of Massialas and Cox's inquiry model, he may have trouble implementing the concepts in actual class discussions. In order to help clarify current research and provide direction to teachers attempting to use the inquiry mode of instruction, we need to know more about the interaction patterns which are characteristic of inquiry versus expository discussions and reflective inquiry versus inquiry-nonprobing discussions.

PURPOSE OF THE STUDY

This study examines three types of classroom discussions centering on social issues: expository, inquiry-nonprobing and inquiry-probing. Specifically, the purpose of the study is to investigate the relationship of these three general discussion styles to : (1) key interaction patterns in the dialogue, (2) the students' evaluation of the teacher and classroom climate, and (3) the students' ability to think critically about social issues.

Some of the questions explored in the first part of the study are: What teacher strategies are associated with these three types of classroom discussions? What kinds of questions do the teachers ask? How much do students participate in the discussion? How often do teachers intervene, either directly or indirectly, in an effort to guide discussions? What happens after students offer hypotheses?

The second part of the study is concerned with students' evaluation of their class and teacher. The major question posed here is: Is there a difference in how students evaluate expository, inquiry-nonprobing and inquiry-probing classes?

The third part of the study examines the relationship of discourse styles to students' performance on the Harvard Social Issues Analysis test, a paper-and-pencil instrument which purports to measure ability to think critically about social issues.

The theoretical context, rationale, and research hypotheses underlying the study are discussed in the following two chapters.

ASSUMPTIONS

The following basic assumptions were made relative to the conduct of the study:

(1) That the effective teaching of social issues is a valid concern of social studies educators.

(2) That the classroom is a social system with a unique organization and patterns of expectations for its members.

(3) That different teaching styles exist which can be identified and which lead to different patterns of class interaction.

(4) That cognitive and noncognitive verbal classroom interaction of teachers and students can be categorized objectively and reliably.

(5) That students' evaluations of the teacher and classroom climate can be reliably measured by means of the Minnesota Student Attitude Inventory.

(6) That important aspects of one's ability to think critically about social issues can be reliably measured by the Harvard Social Issues Analysis Test.

CHAPTER II

THEORETICAL CONTEXT

The theoretical context for this study stemmed from two principal sources: (1) teacher influence in the classroom, and (2) inquiry instruction. Relevant concepts and research in these areas are reviewed in this chapter.

TEACHER INFLUENCE IN THE CLASSROOM

Very few educators would argue with the claim that the teacher is ordinarily the individual with the greatest influence in the classroom. The classroom is a social system with a unique organization and unique patterns of expectations for its members. The individuals in the system have assigned roles and there are explicit rules and implicit expectations regarding the ways in which the teacher and pupils relate to each other. Generally, the classroom is organized on some variant of the autocratic principle, with the teacher occupying the position of authority. The teacher's authority does not arise from the instructional group but, instead, arises from the school as an organization sanctioned by society.[1] Waller observes that the teacher-pupil relationship is a form of institutionalized dominance and subordination. Because teachers are responsible to the community for the mastery of subjects by their students, the political and social organization of the school is one which makes the teacher dominate. It is the business of the teacher to use his dominance to further the process of teaching and learning which is central to the social interaction of the school.[2] The teacher is responsible for structuring classroom activity. He specifies the subject matter and the rules which govern the interaction. "It is the teacher who holds the power to give aid or withhold aid; to judge and to punish; to gratify or to deny; to accept or ignore the response of a child."[3]

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[1] David H. Jenkins, "Characteristics and Functions of Leadership in Instructional Groups", in The Dynamics of Instructional Groups, Fifty-ninth Yearbook of the National Society for the Study of Education, Part II, edited by Nelson B. Henry (Chicago: University of Chicago Press, 1960), p. 165.

After years of studying classroom interaction, Bellack and his associates observe that the teacher is the most active, single person in the classroom. He speaks more frequently than any other participant and his speeches are the longest. Besides lecturing, the teacher's most frequent action is soliciting, a directive move designed to elicit a specific response from the pupils. The pupils' primary task is to respond to the teacher's solicitations. This usually involves answering specific questions posed by the teacher, but may also involve following direct orders given by the teacher. Whenever the teacher makes a soliciting move, the pupil, if at all possible, attempts some form of response. In general, the pupil keeps his solicitations to a minimum. If he does solicit, he restricts his questions to instructional matters. If absolutely necessary, he asks the teacher to clarify an assignment or explain some instructional procedures. On the other hand, the student rarely solicits in regard to substantive matters, or makes a directive statement to the teacher.[4]

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[2] Willard Waller, The Sociology of Teaching (New York: John Wiley and Sons, 1932), pp. 8 and 195.

[3] Marie M. Hughes, "What is Teaching? One Viewpoint," Educational Leadership, IXX (January 1962), 252.

Given the teacher's dominant institutional role, it is not surprising that researchers and curriculum workers agree that a most important variable in classroom interaction is the behavior of the teacher. Furthermore, the teacher behavior which is the most pervasive and continuous in the classroom is, according to Flanders, Hughes and others, verbal communication.[5]

A number of studies have explored the influence of teacher behavior on class interaction. Perhaps the earliest objective study in this area was done by Anderson and his associates.[6] Anderson categorized teacher and pupil verbal and nonverbal interaction into 26 teacher and 29 children behavior categories. From the teacher categories he developed an Integrative-Dominative Ratio. His findings indicate that the Integrative-Dominative style of the teacher sets a pattern which is adopted by the students in the classroom. When the teacher had a higher proportion of integrative contacts, the pupils were more spontaneous, showed more initiative and engaged in more acts of problem solving. On the other hand, dominative teacher behavior led to distracted, aggressive and non-cooperative student behavior.

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[4] Arno Bellack, Joel R. Davitz in collaboration with Herbert M. Kliebard and Ronald T. Hyman, "The Classroom Game," in Teaching: Vantage Points for Study, edited by Ronald T. Hyman (Philadelphia: J.B. Lippincott Company, 1968), pp. 322-325.

[5] Ned A. Flanders, Teacher Influence, Pupil Attitudes, and Achievement (Washington, D.C.: U.S. Department of Health, Education, and Welfare, Office of Education, 1965), p. 1. Also, Hughes, "What is Teaching? One Viewpoint," 251.

Hughes investigated means by which the teacher controls the flow of class dialogue.[7] She classified the verbal discourse in 41 elementary classes. Her analysis highlights the importance of teachers' questions in controlling student participation and structuring the dialogue. A question or statement which required only one answer put the teacher in absolute control and resulted in strict recitation between the teacher and members of the class. The teacher questioned, a student responded. A question or statement which had more than one possible answer resulted in the participation of several pupils before the teacher resumed control of the discourse.

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[6] Harold H. Anderson and Joseph E. Brewer, "Studies of Teachers' Classroom Personalities,II: Effects of Teacher's Dominative and Integrative Contacts on Children's Classroom Behavior," Applied Psychology Monographs, No. 8 (Stanford, California: Stanford University Press, 1946). Also, Harold H. Anderson, Joseph E. Brewer, and Mary F. Reed, "Studies of Teachers' Classroom Personalities, III: Follow-Up Studies of the Effects of Dominative and Integrative Contacts on Children's Behavior," Applied Psychology Monographs, No. 11 (Stanford, California: Stanford University Press, 1946).

[7] Hughes, "What is Teaching? One Viewpoint," Educational Leadership, IXX (January 1962), 271-282.

Four later studies, closely related to concerns of the present investigation, explored the relationship between teaching strategies and student thought processes evident in classroom verbal interaction. Gallagher and Aschner, in their study of the productive thought processes of gifted children, found that a slight increase in divergent questions on the part of the teacher brought forth a large increase in divergent thinking on the part of students. Divergent thinking was defined as an intellectual operation "wherein the individual is free to generate independently his own data within a data-poor situation, or to take a new direction or perspective on a given topic.[8]

Taba and Elzey were interested in the impact of teacher verbal behavior on the thinking of students in the classroom. Four discussions were taped in 20 different classrooms. The verbal discourse was categorized according to three different ratings. The first, "designation", indicated the source of the thought unit, whether it came from the teacher or from the student and whether the person was providing or requesting information. The second rating, "function", described how the thought unit functioned in the context of the discussion. The third rating, "level of thought", categorized the verbal behavior according to its logical quality and level of thought. Taba and Elzey's preliminary analysis of their data revealed "an enormous influence of teacher behavior on the thinking of students. This impact is exercised in a variety of ways: by the nature of the questions asked, what the teacher gives to the students or seeks from them, the timing of these acts and the total sequence, which ideas are picked up or elaboration and which are passed over, points at which approval and disapproval are given...."[9]

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[8] James J. Gallagher and Mary Jane Aschner, "A Preliminary Report on Analyses of Classroom Interaction," Merrill-Palmer Quarterly of Behavior and Development, IX (July 1963), 186.

Miller, at the University of Utah, compared the classroom thinking of students instructed by very directive teachers with the thinking of students instructed by responsive teachers. Directive teaching was defined as teaching which is highly structured and prescriptive. In responsive teaching, the teacher loosely structures the discourse and responds to cues emitted by the students. In his analysis of the classroom dialogue, Miller found that high directive teaching was accompanied by pupil comments which were restricted almost entirely to recognition and recall. The comments of students under responsive teachers revealed significantly higher levels of thought.[10]

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[9] Hilda Taba and Freeman F. Elzey, "Teaching Strategies and Thought Processes," Teachers College Record, LV (March 1964), 524-534.

In a similar study, Gantt contrasted the effects of controlling and pupil-centered teacher behavior on student performance. Pupil-centered behaviors are those which assist the student in his efforts to express and communicate his feelings, opinions, and judgments while controlling behaviors are those which refocus pupil comments, inform, evaluate, and direct. A lower incidence of student responses at higher levels of cognitive thought was found to coincide with a lower incidence of pupil-centered behaviors on the part of the teacher.[11]

Although most research consistently supports the notion that the teacher's behavior has a great influence on interaction in the classroom, research on the relationship between teacher behavior and student outcomes, as measured by paper-and-pencil instruments, has not historically resulted in the same consistent set of findings. In fact, after reviewing research in this area from 1900 to 1952 Morsh and Wilder concluded:

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[10] George L. Miller, Jr., An Investigation of Teaching Behavior and Pupil Thinking, doctoral dissertation, University of Utah, 1964 (Ann Arbor, Michigan: University Microfilms, No. 64-10,623).

[11] Walter N. Gantt, The Diagnosis of Pupil Verbal Response Cues as Indicators of Thinking and Learning, doctoral dissertation, University of Maryland, 1968 (Ann Arbor, Michigan: University Microfilms, No. 69-7200).

> "No single, specific, observable teacher act has yet been found whose frequency or percent of occurrence is invariable (and) significantly correlated with student achievement. There seems to be some suggestion, however, that questions based on student interest and experience rather than assigned subject matter, the extent to which the instructor challenges the students to support ideas, and the amount of spontaneous student discussion, may be related to student gains."[12]

Flanders and Simon, though, have pointed out that the search to identify teaching behaviors which are consistently associated with positive pupil attitudes and achievement has in recent years been much more successful than in the past. Progress in this area, according to them, has been possible, for the most part, because of the development of systems for analyzing verbal communication in the classroom.[13]

Flanders has been a major leader for the last decade in investigating the relationship between classroom verbal interaction and student attitudinal and achievement outcomes. Building upon the Integrative-Dominative and classroom-climate concepts of Anderson and Withall, Flanders developed an I/D ratio for measuring a teacher's style of influence in the classroom. In his system, observers, using ten categories, score teacher and student verbal behavior at 3 second intervals. Various teacher categories are viewed as having direct or indirect influence on the course of the classroom interaction. Teacher behaviors identified as "direct" include lecturing, giving directions, and criticizing students. "Indirect influence" behaviors include asking questions, reinforcing and using student ideas. In four separate, extensive studies between 1957 and 1962 Flanders found that high teacher I/D ratios are directly related to average class scores on attitudinal measures of teacher attractiveness, student motivation, and class climate.[14]

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[12] James E. Morsh and Eleanor W. Wilder, "Identifying the Effective Instructor: A Review of the Quantitative Studies, 1900-1952," USAF Personnel and Training Research Center Bulletin, No. AFPTRC-TR-54-44 (San Antonio, Texas: U.S. Air Force, 1954).

[13] Ned A. Flanders and Anita Simon, "Teacher Effectiveness," in Encyclopedia of Educational Research, a project of the American Educational Research Association, edited by Robert L. Ebel (Toronto: Macmillan 1969), p. 1425.

Several other studies since 1965 also support Flanders' conclusion that pupils exposed to a teacher who makes use of and reinforces their ideas and opinions have positive attitudes toward their teacher and class. In two separate studies of classroom interaction in Pennsylvania and Michigan, LaShier[15] and Morrison[16] found significant, positive relationships between a teacher's I/D ratio and positive student attitudes. Johns, studying six high school English classes in Detroit, found that teacher behavior which reinforces and uses student ideas is related to positive student attitudes.[17] Pankratz in a study of 10 physics classes found that teachers who had records of high class averages on pupil-attitude inventories used more indirect influence in the classroom.[18] Lauren, who used an I/D ratio very similar to the one developed by Flanders, studied interaction in eight high school Earth Science classes. He found a significant relationship between the percentage of teacher indirectness and positive responses on a Pupil Survey of Classroom Climate.[19]

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[14] Flanders, Teacher Influence, Pupil Attitudes, and Achievement.

[15] William S. LaShier, Jr., An Analysis of Certain Aspects of the Verbal Behavior of Student Teachers of Eighth-grade Students Participating in a BSCS Laboratory Block, doctoral dissertation, University of Texas, 1965 (Ann Arbor, Michigan: University Microfilms, No. 66-1938).

[16] Betty Mae Morrison, The Reactions of Internal and External Children to Patterns of Teaching Behavior, doctoral dissertation, The University of Michigan, 1966 (Ann Arbor, Michigan: University Microfilms, No. 66-14560).

In addition to attitudes toward the teacher and class, the other student outcome of interest in this study was critical thinking. While considerable research in recent years has investigated classroom behavior and student achievement and attitudes, a review of the literature uncovered only two studies which explicitly examined the relationship between classroom interaction and the critical thinking skills of students, as measured by paper-and-pencil instruments.

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[17] Joseph P. Johns, The Relationship Between Teacher Behaviors and the Incidence of Thought-provoking Questions by Students in Secondary Schools, doctoral dissertation, The University of Michigan, 1966 (Ann Arbor, Michigan: University Microfilms, No. 67-1758).

[18] Roger Pankratz, "Verbal Interaction Patterns in the Classrooms of Selected Physics Teachers," in Interaction Analysis: Theory, Research, and Application, edited by Edmund J. Amidon and John B. Hough (Reading, Massachusetts: Addison-Wesley Publishing Company, 1967), pp. 189-209.

[19] Paul M. Lauren, Teacher Behavior, Classroom Climate, and Achievement: An Investigation of Pupil Perception of Classroom Interaction and Its Relationship to Achievement Within Experimentally Controlled Learning Environments, doctoral dissertation, New York University, 1968 (Ann Arbor, Michigan: University Microfilms, No. 69-21,193).

Gagnon examined the impact of teacher clarifying questions on students' critical thinking skills. His study compared the interaction in two groups of fifth and sixth grade classes. In one group the teacher concentrated on asking students to clarify their opinions and ideas. In the other, the teachers asked very few clarifying questions. The results indicated that students exposed to a high incidence of clarifying questions not only participated significantly more in discussions, but also performed somewhat better on a written critical thinking test. The differences between the two groups on the critical thinking test were not significant at .05, but did reach the .09 level of significance.[20]

The Indiana Experiments in Inquiry studied the impact of inquiry instruction on the development of students' critical thinking skills. The investigators explicitly specified the kinds of teacher and student behaviors which characterize inquiry in the classroom. Although they did not categorize the classroom interaction, they did analyze tapes of dialogue in order to verify that the inquiry method was, in fact, applied in the classroom. An analysis of the results revealed that in comparison to students instructed in the traditional mode, the students exposed to inquiry instruction made statistically significant gains on a critical thinking test.[21]

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[20] A. Lawrence Gagnon, An Analysis of an Experimental Methodology for Teaching Thinking and Clarifying Values, doctoral dissertation, Wayne State University, 1965 (Ann Arbor, Michigan: University Microfilms, No. 66-10,104).

That the teacher can influence student behavior and promote higher levels of student participation and thinking in the classroom seems to be supported both by theory and research. The basis for the teacher's influence is derived from the unique characteristics of the classroom as a social system. How a teacher chooses to use his influence is affected by the pupils in the class, his own personality, educational goals, and implicit theory of instruction.

INQUIRY INSTRUCTION

Bruner states that "a theory of instruction is prescriptive in the sense that it sets forth rules concerning the most effective way of teaching....it sets up criteria and states the conditions for meeting them..."[22] Inquiry is a theory of instruction which takes as its central goal cognitive growth or an increased ability to think reflectively. Many writers in the field of social studies have offered suggestions concerning the elements they believe should be included in this theory.

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[21] Byron G. Massialas, C. Benjamin Cox, Jack E. Cousins, and Robert T. Elsmere, The Indiana Experiments in Inquiry: Social Studies (Bloomington, Indiana: School of Education, Indiana University, May 1963).

(a) Components of Reflective Thought

Dewey stressed that reflective thinking is intertwined with problem solving. The student must be confronted with a genuine problem to solve before thinking can take place.[23] Hullfish and Smith agree. In their opinion reflection differs from the looser kinds of thinking by being directed or controlled by a purpose, the solution of a problem. They identify the major components of inquiry as recognizing and clarifying a problem situation, and formulating, testing, and modifying hypotheses.[24]

A problem is any event or situation for which the individual does not have a habitual or patterned response or, according to Suchman, an event or situation that challenges one's idea of the universe.

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[22] Jerome Bruner, Toward a Theory of Instruction (Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 1967), p. 40.

[23] John Dewey, Logic: The Theory of Inquiry (New York: Henry Holt and Company, 1938), pp. 105-111.

[24] H. Gordon Hullfish and Phillip G. Smith, Reflective Thinking: The Method of Education (New York: Dodd, Mead & Company, 1965), p. 90.

> "Such discrepant events create dissonance within the cognitive systems of the perceiver. They also provide a focal point for the initiation of the inquiry process and the initial motivation to overcome the inertia of complacency--the complacency that grows out of the satisfaction of one's existing state of knowledge."[25]

Problems in the social sciences tend to fall into two general categories: those which involve trying to explain events or data and those which have some action or policy implications. Examples in the first category include problems such as: What were the causes of the Watts riots? Why did Britain devalue the pound? Why is the crime rate in the United States rising? Examples of problems in the latter category include: Should abortion be legalized? Should the United States have sent troops into Cambodia? Where should the government build the new nuclear reactor? Should Britain enter the Common Market? Problems of this type form the heart of the inquiry into social issues.

A hypothesis is a proposed solution to a problem or part of a problem. It attempts to account for or explain facts already observed and suggests explanations, relationships, courses of action or policy which would apply to the social phenomenon under consideration. In the process of grappling with a problem, many alternative hypotheses may be posed.

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[25] J. Richard Suchman, "Learning Through Inquiry," in Inquiry in the Social Studies, edited by Rodney F. Allen, John V. Fleckenstein, and Peter M. Lyon (Washington, D.C.: National Council for the Social Studies, 1967), p. 56.

These hypotheses are tentative hunches, guesses, ideas or insights. Organ observes that:

> "Hypothesis formation is a highly subjective process. The selection of hypotheses depends upon objective facts, but also upon the hopes, values, and desires of the problem solver. A hypothesis is a very personal affair. It is the thinker's brainchild."[26]

Each hypothesis suggests a way to attack the problem and "operates as a guide in going ahead with the solution."[27] The production of hypotheses is crucial to the inquiry process. Without hypotheses, the search for a solution is random and unorganized. Without a hypothesis one has no guide for collecting relevant data or information.

"A hypothesis is tested by throwing against it whatever pertinent knowledge the problem-solving group possesses or is able to acquire."[28] The process of testing, according to Massialas and Cox, consists of examining a hypothesis in terms of its validity as an explanation of the problem, its compatibility with the experiences of the pupils and teacher, and the existence of facts and evidence which are relevant to its proof or disproof.[29] Throughout testing, it is important that terms and concepts be defined and clarified. In many discussions, individuals fail to communicate their ideas to one another simply because they are not using the same frame of reference or the same meaning for terms. By defining and clarifying the meaning of words and concepts, the group greatly improves the chance that hypotheses, evidence, and arguments will at least be understood by the participants. The testing process also involves evaluating the knowledge and evidence brought to light. Evidence, in spite of many statements to the contrary, does not speak for itself. Judgments have to be made about its reliability, sufficiency, consistency, and relevance to the question under consideration.

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[26] Troy Wilson Organ, The Art of Critical Thinking (Boston: Houghton Mifflin Company, 1965), p. 90.

[27] Louis E. Raths, Selma Wassermann, Arthur Jonas, and Arnold M. Rothstein, Teaching for Thinking: Theory and Application (Columbus, Ohio: Charles E. Merrill Books, Inc., 1967), p. 16.

[28] Maurice P. Hunt and Lawrence E. Metcalf, Teaching High School Social Studies (New York: Harper and Row, Publishers, 1968), p. 68.

In testing a hypothesis, one explicitly or implicitly questions whether the hypothesis is "defensible" in light of the problem and evidence available. Does the hypothesis explain the problem? Is it supported by the evidence presented? If the answer to either of these questions is "no," then the hypothesis may be modified or discarded. If the answer to both of these questions is "yes," then the hypothesis is accepted. A hypothesis which survives examination and testing represents the "solution" to the problem. As in all inductive procedures, though, the surviving hypothesis remains hypothetical in nature. It simply represents the best answer at the present time to the problem that generated the inquiry.[30]

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[29] Byron G. Massialas and C. Benjamin Cox, Inquiry in Social Studies (New York: McGraw-Hill Book Company, 1966), p. 117.

(b) Conditions Which Promote Classroom Inquiry

What classroom conditions promote student inquiry? How can teachers use their influence to create these conditions and provide opportunities for inquiry? One condition indispensible to meaningful inquiry is the existence of a problem which is real and meaningful to students. The problem may be presented by the teacher or raised by the students. In either case, it is imperative that the students *feel* that there is a problem and that this problem is worth investigating. Failure to make certain that the students feel a problem exists, according to Hunt and Metcalf, "automatically destroys whatever opportunity may have existed to stimulate sustained and energetic reflection."[31]

Most advocates of inquiry instruction have stressed the importance of an "open classroom climate" in promoting and sustaining reflective inquiry. Massialas and Cox state that "the climate of the reflective classroom is psychologically open and permissive. All points of view and statements are solicited and accepted as propositions which merit examination."[32] In the open classroom students participate directly in formulating and testing their ideas.[33] All members of the class have an opportunity to offer their opinions and influence the direction of the discussion. The teacher communicates an open climate by encouraging a range of contributions and by using and responding thoughtfully to students' comments.[34] Both questions and divergent comments are accepted and examined. The teacher never responds to a student idea with ridicule or sarcasm. Creative expression is legitimized and the teacher encourages students to "play their hunches and to conjecture."[35] Crabtree points out that an open climate is important for reflective inquiry because it encourages students to deal with problems in their own terms and allows an open search for alternatives.

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[30] Organan, *The Art of Critical Thinking*, p. 219.

[31] Hunt and Metcalf, *Teaching High School Social Studies*, p. 170.

> "Perhaps most critical of the classroom arrangements which support hypothetical thinking are the opportunities the teacher provides for an open search for alternatives. Recognizing and resolving an indeterminate situation, a value-conflict, or an intellectual inquiry requires

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[32] Massialas and Cox, Inquiry in Social Studies, p. 112.

[33] Byron G. Massialas and Jack Zevin, Creative Encounters in the Classroom (New York: John Wiley & Sons, 1967), p. 25.

[34] Charlotte Crabtree, "Supporting Reflective Thinking" in Effective Thinking in the Social Studies, thirty-seventh Yearbook of the National Council for the Social Studies, edited by Jean Fair and Fannie R. Shaftel (Washington, D.C.: National Council, 1967), p. 101.

[35] Massialas and Zevin, Creative Encounters in the Classroom, p. 26.

> that students feel free to examine the situation, to take positions regarding it, to engage in a search for hypotheses....Students need to know that an examination of alternatives...is welcome, and that severe sanctions will not follow expression of a minority view, an early misreading of the data, or a commitment made which, on the basis of further evidence, the student may wish to revise."[36]

An open climate of discussion does not mean that the discussion is undirected. In fact, Massialas and Cox point out that one of the unique characteristics of a reflective classroom is its sustained focus. This focus distinguishes reflective discussions from undirected discussions in which a participant is free to say what he wants but where the dialogue is apt to ramble without a clear point of direction.[37] Although in some classes students, themselves, will maintain the focus of the discussion and extend hypotheses to their logical conclusions, generally, according to Hunt and Metcalf, Crabtree and Suchman, it is up to the teacher to insure that the discussion exhibits a sense of purpose and direction.

The key is for the teacher to maintain focus without monopolizing the discussion or stifling reflection on the part of students. The teacher does this by asking questions which instigate and push forward components of the reflective process. Massialas and Zevin have offered some specific suggestions. In their opinion, the reflective teacher avoids lecturing. Instead, he asks for hypotheses and then continually challenges and probes students to explore, clarify, and test alternatives. "He summarizes, recapitulates, and asks for clarification of points made by the students. During times of impasse he may raise additional questions regarding the problem at hand. These questions may help the class to see alternative ways of solving a problem."[38] Throughout the discussion, the teacher builds upon student's ideas and reinforces logical operations which push forward the steps of reflective thought.

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[36] Crabtree, "Supporting Reflective Thinking," p. 101.

[37] Massialas and Cox, Inquiry in Social Studies, p. 113.

(c) Inquiry Into Social Issues

One of the primary goals of the social studies is to prepare students to live and participate actively as citizens in our society.[39] This means, among other things that, as citizens, students must be prepared to make informed, defensible decisions about major controversial issues. What should we do about the war in Vietnam? How can we maintain social order, yet not deny individuals the rights of free speech and assembly? What areas or programs should have top priority in federal spending? How can we meet our nation's demands for electric power without polluting the environment? Problems such as these represent some of the controversial issues confronting our society today.

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[38] Massialas and Zevin, Creative Encounters in the Classroom, pp. 25-26.

[39] National Council for the Social Studies, "A Guide to Content in the Social Studies," in Crucial Issues in the Teaching of Social Studies edited by Byron G. Massialas and Andreas M. Kazamias (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964), p. 20.

Engle, Hunt and Metcalf, Oliver and Shaver, Massialas and Cox, and others argue that if students are to learn to deal rationally and intelligently with these issues, they must have practice reflectively examining these issues in the classroom. Resolution of these issues does not depend only upon "the facts," but also involves negotiation of priorities and values. Probably the general goals of our society--freedom, justice, social order, equality of opportunity--are agreed upon by most people, but the relationship between these goals, their specific meaning, and means of implementation continually generate controversy. As Chesler points out,

> "Sometimes differences arise out of confrontations between opposing values or sets of values; at other times conflicts come about as a result of differing priorities or means for the same general values. For instance, the prime concern of some white Southerners is the maintenance of social order. For them justice is important but secondary. Negro protest movements are far more concerned with justice than order, although they would like both.... Even when goals are agreed upon, major differences can arise with respect to the means used to attain these goals. For example, Negro groups disagree on whether to seek social equality through accommodation, through integration, through black power, or through conflict. Each choice of means reflects a different value preference."[40]

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[40] Mark Chesler, "Values and Controversy in Secondary Social Studies" in Social Studies in the United States, edited by C. Benjamin Cox and Byron G. Massialas (New York: Harcourt, Brace & World, Inc., 1967), pp. 271-272.

Teaching students to accept a single view of man and society is not realistic. It ignores the changing, pluralistic nature of our society. It ignores the fact that men just do not agree on the appropriate resolution of conflicts.

Social issues provide a natural springboard for reflective inquiry in the classroom. They represent real problems with indeterminate solutions. Generally, students feel that they are meaningful topics for their consideration. Since social issues involve competing values, students tend to spontaneously pose a number of possible alternative solutions based upon their own knowledge and values. Whether these alternatives or hypotheses are probed and tested, though, depends upon the interaction of the classroom participants.

CHAPTER III

RATIONALE AND HYPOTHESES

The major question which guided the first part of this study was: what teacher strategies and specific class interaction patterns are associated with reflective inquiry into social issues? It was argued in the previous chapter that social problems provide a natural springboard for inquiry, but whether or not these issues are dealt with reflectively depends on the interaction of the classroom participants. In this study the essential components of reflective thinking were defined as (1) recognizing a problem, (2) presenting hypotheses, and (3) probing hypotheses by testing their "defensibility." Classroom discussions which emphasized all of these aspects of reflective thought were characterized as inquiry-probing. Classroom discussions which emphasized the first two components, recognizing a problem and generating hypotheses, but not the third, probing hypotheses, were classified as inquiry-nonprobing. In classes where the discussion consisted primarily of exposition and hypotheses were infrequently generated or probed, the discussion was categorized as expository.

What teacher strategies promote inquiry-probing, inquiry-nonprobing or expository class discussions? By conceptualizing class discussions as composed of series of cognitive interaction sequences, one can see more clearly how the teacher's behavior can influence the cognitive nature of social issues dialogue.

COGNITIVE INTERACTION SEQUENCES

Cognitive interaction sequences occur throughout the class dialogue; they flow from and build upon one another. Some sequences entail the sharing of background information. Some include hypothesizing. Some include clarifying the problem or defining terms. While others may involve grounding a position or hypotheses. Some phases of the interaction may be carefully directed by the teacher, while in others the students are free to generate and discuss their own ideas and opinions. At almost any point, a participant can interrupt a given sequence and change the focus of the discussion. For the purposes of this discussion, cognitive interaction sequences are viewed as expository, inquiry-nonprobing and inquiry-probing.

(a) Expository Sequences

Expository sequences are those which involve the sharing or summarizing of background information. From this perspective, exposition encompasses the first two cognitive levels in Bloom's taxonomy--knowledge and comprehension. Knowledge involves the recall of specifics and universals and emphasizes the process of remembering. Comprehension is a low level of understanding; the individual knows what is or was communicated and can summarize the material or idea without necessarily relating it to other material or seeing its fullest implications.[1]

In some expository sequences, the only active participant is the teacher. When the teacher lectures from notes, reads from a book, or explains information to the class, he is providing exposition. The students are not actively participating; instead, they are expected to absorb the comments or material presented by the teacher. In other expository sequences the students are more involved in the interaction. They may provide exposition by reading or summarizing a passage from a book or by repeating and paraphrasing remembered information. The following excerpt taken from a taped class dialogue is an example of an expository sequence in which both the teacher and students are sharing background information. The class is discussing civil rights, and at this point in the discussion the participants are reviewing the history of the civil rights movement.

> T: Amendments 13, 14 and 15 to the Constitution were designed to guarantee Negroes their rights as citizens of the United States. But in many places Negroes remained second-class citizens. In the 1950's a movement began to obtain civil rights for the Negroes in the South. Polly, how did the civil rights movement in the South begin?
>
> G: Well, the movement started when a Negro woman wouldn't give up her seat on a bus to a white passenger. Martin Luther King led a boycott of the buses. Sit-ins were held in restaurants, pray-ins at churches, and wade-ins at beaches.

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[1] Benjamin S. Bloom, ed., Taxonomy of Education Objectives: Cognitive Domain (New York: Longmans, Green and Company, 1956), pp. 62-119.

T: OK. What were they protesting? John?

B: Discrimination, not having rights.

T: What kind of discrimination?

B: In housing, education, jobs. Being able to sit where they wanted in buses and restaurants.

At the beginning of this sequence the teacher is providing background information. Then she asks a series of questions which require student exposition regarding the history of the civil rights movement. The teacher has set the framework and is calling upon students to fill in the sequence of information which she, as the teacher, wishes to develop. The flow of teacher input which results in exposition may be conceptualized as follows:

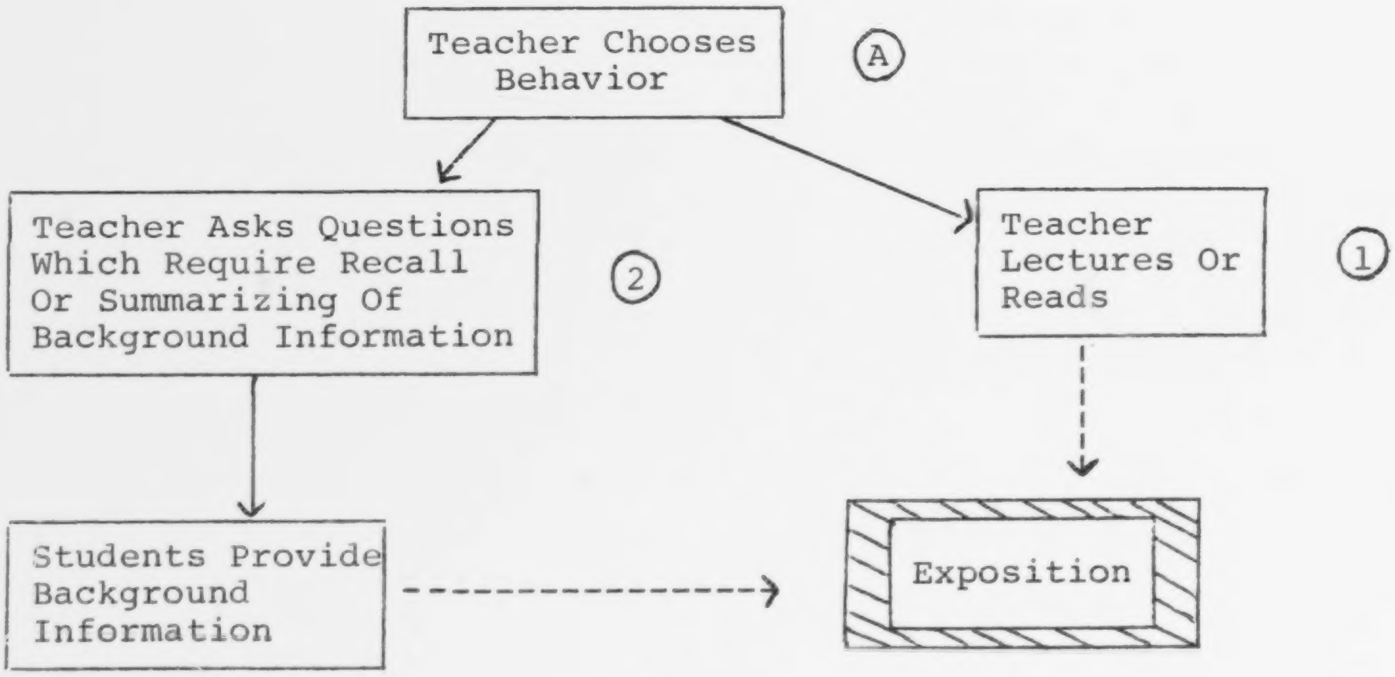

Teacher Chooses Behavior
Ⓐ
Teacher Asks Questions Which Require Recall Or Summarizing Of Background Information
②
Teacher Lectures Or Reads
①
Students Provide Background Information
Exposition

Figure 3-1

At point A in the diagram the teacher chooses whether he will present the background information himself or whether he will ask students to recall and fill-in the information. If the teacher lectures or reads, he has chosen to use, in Flanders' terms, direct influence. The students do not have an opportunity to participate. If the teacher selects alternative two, he has chosen to use indirect influence; the students now have an opportunity to participate but their participation is limited to the expected answer. The choice of either of these alternatives leads to an expository interaction sequence. The first involves teacher exposition, the second, student exposition.

(b) Inquiry-Nonprobing Sequences

Inquiry-nonprobing sequences differ from expository sequences in that the teacher and students do more than explain or present remembered information; instead, they are actively offering their own opinions, hypotheses or positions. In these types of sequences the speaker makes statements which include or imply the phrases "I believe," "I think," "I hold," "I feel," etc., followed by his hypotheses, preferences, evaluations or judgments regarding a given issue. Both the teacher and students participate in most inquiry-nonprobing sequences. In the process of grappling with a problem many positions or hypotheses may be posed. Some may deal directly with the problem, others may pertain to sub-issues brought up during the discussion.

In the sequence presented below, the class is discussing mercy killing. They have visited an institution for children born with such severe defects that they cannot walk, talk, or take care of themselves. The class is discussing what should be done about the situation.

T: Do you think mercy killing should be made legal?

G: Yes. It should be, if parents give their consent. I don't see any reason to keep those kids alive.

T: John.

B: How could you legalize killing those kids. I couldn't kill them. I couldn't live with that the rest of my life.

G: It is not like you are taking a life. They are not human; it is just that...

B: You're wrong, they're human. They are human; it is just that...

G: They're not really human. They have no brain actually.

The teacher touched off the sequence by asking if the students thought mercy killing should be legalized. The students then stated their positions on two issues: whether mercy killing is a desirable solution and whether the kids in the institution are "really human." The girl thinks mercy killing is a desirable solution; the boy does not. The girl presents an opinion that the kids are not really human; the boy disagrees. At this point in the discussion, neither of the students has defended his position or opinion. The teacher has not offered his opinion, but if he chose to do so, he certainly could. A problem frequently occurs, though, when the teacher gives his opinion. The students are so used to regarding the teacher as "the authority" that they often accept his opinion as fact or the solution to the problem. Teachers can promote student position-taking or hypothesizing by asking questions such as "What do you think...," "Do you have any suggestions...," "Any more ideas?," "John, what is your reaction to Carol's ideas?," "How would you explain this information?," etc.

(c) Inquiry-Probing Sequences

Inquiry-probing sequences differ from inquiry non-probing sequences in that the class participants are defending their positions and hypotheses. They are clarifying and defining their ideas and words. They are using evidence to validate or evaluate opinions and hypotheses. The following is an example of an inquiry-probing sequence. The students are discussing alternatives to the draft and at this point are trying to decide whether a National Service Program or the draft is more democratic.

T: Bob, which do you think would be more democratic?

B1: The National Service Program would be because all physically fit people would have to serve; there's no discrimination as to rich or poor, black or white.

T: Steve?

B2: It would be less democratic because everyone would have to serve, everyone would have to give up their liberties; there would be no way, no way you could get out of it.

T: Why is the system less democratic? You said it's less democratic. Why?

B2: Because you are forced to do it. You don't have a choice. Maybe you don't want to go in the Peace Corps or Vista or even in the armed services, but this way you have to do it. The thirteenth amendment strictly forbids involuntary service.

T: All right, Rick, what?

B3: Well, I think the National Service is even more democratic than the draft. The draft and the National Service are both involuntary servitude. You have to go in if you are drafted. At least in the National Service you have a choice between the armed service, Vista, the Peace Corps.

Gl: But the draft doesn't force everybody to go in because you can always get a student deferment. People who don't want to go in usually have an argument and they say, okay, you don't have to. In the National Service you are forced.

B3: But for the draft to be democratic, all people should have the same opportunity to get a deferment or stay out. This isn't what happens. I was reading that poor people and blacks get drafted faster than rich people. They can't get student deferments because they can't afford to go to college.

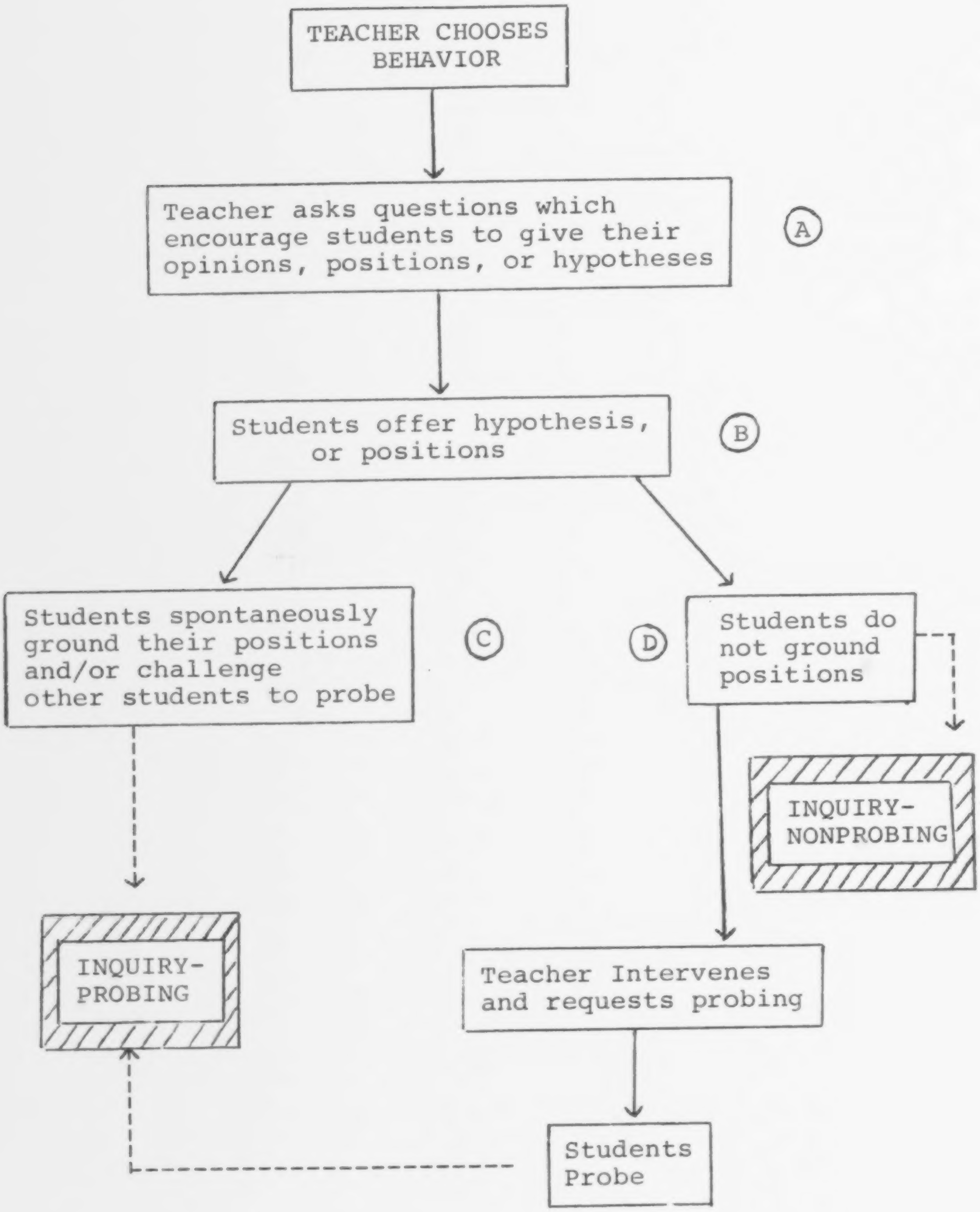
T: It seems to me that we have to decide what we mean by democratic. Joan, you were saying that the draft is more democratic because you are not forced. What do you mean by democratic?

In the above sequence the students are presenting their positions and attempting to defend them. Boy one thinks the National Service Program is more democratic than the draft. The reason he gives is that there is no discrimination in a National Service Program--everyone would have to serve. Boy two disagrees; he thinks the National Service is less democratic because everyone is forced to serve. The third boy argues that being forced isn't the issue because both systems involve involuntary servitude. The girl tries to refute boy three's position by pointing out people can get out of the draft. Boy three then tries to clarify what he means by democratic and stresses that the evidence indicates that his definition of democratic is not met by the current draft system. Besides calling on students, the teacher enters the interaction at two points--once she asks boy two to support his position; the other time she realizes that the students are implicitly using two different definitions for democratic and she asks the girl to clarify what she means by democratic.

There are several ways that probing of student positions may occur: the students may spontaneously support or clarify their own positions and challenge other students to do likewise or the teacher may intervene and ask questions which encourage students to define terms or give reasons for their positions. Teacher requests for probing often include statements such as, "Why do you think...," "What do you mean by...," "Is there any evidence...," "What are your reasons...," etc.

The following diagram conceptualizes how, during a discussion of social issues, the teacher can use his classroom influence to promote inquiry-nonprobing or inquiry-probing interaction. At point A the teacher asks questions which encourage the students to give their opinions, hypotheses or positions relative to the problem at hand. For example, in the sequence

FIGURE 3-2


TEACHER CHOOSES BEHAVIOR
Teacher asks questions which encourage students to give their opinions, positions, or hypotheses
Ⓐ
Students offer hypothesis, or positions
Ⓑ
Students spontaneously ground their positions and/or challenge other students to probe
Ⓒ
Ⓓ
Students do not ground positions
INQUIRY-NONPROBING
INQUIRY-PROBING
Teacher Intervenes and requests probing
Students Probe

dealing with mercy killing, the teacher asked, "Do you think mercy killing should be made legal?" While in the sequence involving alternatives to the draft, the teacher asked, "Which do you think would be more democratic?" In both cases, the teacher is not only using indirect influence, but is also opening up a wide range of possible responses on the part of the students. He is encouraging the discussion to move toward inquiry. At point B the students respond to the teacher's open-ended question by offering their own opinions. For example, "It (mercy killing) should be, if parents give their consent." Or, "The National Service Program would be...." The students, then, may spontaneously support their positions and challenge their fellow students to do likewise, point C, thus causing the interaction sequence to move to inquiry-probing. Or the students may just continue hypothesizing and stating positions without clarifying or testing them, point D. At this juncture, the teacher may choose to intervene and use his influence to get students to ground or clarify their positions--a strategy used twice by the teacher in the draft versus national service sequence. If the teacher does so, it is quite likely that the students will begin to probe their positions, thus again, moving the sequence to inquiry-probing. If, on the other hand, the teacher does not intervene and the students do not ground their positions, the interaction is inquiry-nonprobing. This diagram is, of course, over-simplified, but it does help one conceptualize how the teacher's verbal behavior can promote and influence inquiry sequences.

THREE TYPES OF DISCUSSIONS

In this study classes which spent a major portion of their time actually presenting, clarifying, and supporting hypotheses, positions, or opinions were characterized as inquiry-probing. Classes which spent considerable time presenting hypotheses or positions but which did not devote much time to probing their positions were characterized as inquiry-nonprobing. In classes where most of the time was devoted to exposition and very little time was given to either presenting or probing hypotheses, the discussion was categorized as expository. The specific criteria used for classifying the discussions are presented and discussed in Chapter V. It is important to point out that class discussions were classified according to the time spent by the teacher and students performing certain cognitive operations. The first goal of the study was then to look at specific interaction patterns in the dialogue to determine which ones are associated with the three types of class discussion.

The literature reviewed in Chapter II and the discussion of interaction sequences in this chapter have emphasized the importance of teacher influence in initiating and supporting student inquiry. It has been argued that on the one hand, the teacher limits student discussion and inquiry by lecturing or asking questions which require essentially one, specified answer. On the other, the teacher promotes higher levels of student participation and inquiry by using indirect influence and asking questions which encourage students to generate, probe, and test hypotheses. If these assumptions are, in fact, true, then one would expect teachers in inquiry classes (both probing and nonprobing) to use significantly more indirect influence and ask significantly more non-expository questions than teachers in expository classes. Furthermore, since Flanders and others have found that indirect influence is related to the amount of student class participation, one would also expect students in inquiry classes to spend more time participating in the discussion than students in expository classes.

What happens after a student states a position or hypothesis? The answer to this question should differ dramatically in inquiry-probing as opposed to inquiry-nonprobing classes. After a student presents a hypothesis in an inquiry-probing class, it was expected that one of three cognitive events would frequently occur: (1) the student would spontaneously ground his hypothesis, (2) another student would ask him to defend or clarify his position, or (3) the teacher would request that the position be probed further. In inquiry-nonprobing classes, however, it was expected that these three cognitive events would rarely occur after a student presents a hypothesis.

The research hypotheses regarding specific aspects of the class interaction in expository, inquiry-probing and inquiry-nonprobing classes were as follows:

(1) Teachers in inquiry classes will use more indirect influence than teachers in expository classes.

(2) Teachers in inquiry classes will ask more open-ended, non-expository questions than teachers in expository classes.

(3) There will be more student participation in inquiry classes than in expository classes.

(4) After a student presents a hypothesis, the following will occur more frequently in inquiry-probing classes than in inquiry-nonprobing classes: (a) the student will spontaneously defend or support the hypothesis, (b) the teacher will request that the hypothesis be probed, and (c) other students will request that the hypothesis be probed.

STUDENT ATTITUDES TOWARD THE TEACHER AND CLASS

The second question posed in this study was: What are the students' attitudes toward the teacher and the class in expository, inquiry-nonprobing and inquiry-probing classes? Three attitudinal dimensions were stressed: (1) the students' overall evaluation of the teacher and class, (2) the teacher's style of discipline and control, and (3) the perception of order and purpose maintained in the class. The research of Flanders and others, reviewed in the previous chapter, indicates that indirect teacher influence and use of student ideas is associated with positive student attitudes. The attitudes explored in these studies usually involve the students' overall evaluation of the teacher and class. Since in this study it was hypothesized that teachers in inquiry classes will use more indirect influence and ask more open-ended questions than teachers in expository classes, it was also expected that students in inquiry classes would have a more positive overall evaluation of their teacher and class than students in the expository classes.

As discussed earlier, most proponents of inquiry instruction stress the importance of an open classroom climate and the existence of mutual respect between the teacher and students in promoting and sustaining reflective inquiry. These writers argue that only when students feel free to offer and examine alternatives and only when they perceive that the teacher responds thoughtfully to their comments and ideas will genuine reflection take place. Thus, one would expect students in inquiry-probing classes to have a very high evaluation of their teacher's style of class maintenance and support.

In inquiry-nonprobing discussions, the students and teacher are hypothesizing but not probing their hypotheses; thus, the dialogue is apt to ramble without a clear direction. Given the undirected nature of inquiry-nonprobing discussions it is quite possible that less order and purpose is present in these classrooms than in inquiry-probing or expository classes.

Specifically, the research hypotheses regarding the students' evaluation of the three types of class discussions were as follows:

(5) The students in the inquiry classes will have a higher overall evaluation of their teacher and class than students in the expository classes.

(6) The students in the inquiry-probing classes will feel more positively toward their teacher's style of class maintenance and support than the students in expository or inquiry-nonprobing classes.

(7) The students in the inquiry-probing classes will feel that more order and purpose is present than the students in the inquiry-nonprobing classes.

(8) The students in the expository classes will feel that more order and purpose is maintained in their class than the students in the inquiry-nonprobing classes.

SOCIAL ISSUES CRITICAL THINKING TEST

The third question explored in this study was: how do students exposed to expository, inquiry-nonprobing, and inquiry-probing class discussions perform on a paper-and-pencil test designed to measure their ability to think critically about social issues? Proponents of social issues inquiry instruction argue that inquiry instruction increases students' ability to deal rationally and intelligently with issues in our society. They assume that if students deal reflectively with social problems in class, they will develop competence in the analysis of public controversy.

If the above argument is true, then one would expect students in the inquiry-probing classes to perform better on a written critical thinking test dealing with social issues than students in either the expository or inquiry-nonprobing classes.

Furthermore, looking again at the diagram in Figure 3-2, one would expect students in the inquiry-probing classes which exhibit a high incidence of B to C interactions to perform particularly well on the critical thinking test. These students spontaneously probe their positions and challenge other students to do likewise without intervention from the teacher. Evidently, they have internalized the operation of probing.

The following research hypotheses were investigated regarding the performance of the students on the critical thinking test:

(9) The students in the inquiry-probing classes will perform better on the social issues critical thinking test than the students in the expository classes.

(10) The students in the inquiry-probing classes will perform better on the critical thinking test than the students in the inquiry-nonprobing classes.

(11) The students in the inquiry-probing classes which have a high incidence of spontaneous student grounding will perform better on the critical thinking test than students in the inquiry-probing classes which do not have a high incidence of spontaneous student grounding.

SUMMARY

One of the underlying assumptions in this study is that different styles exist in classroom discussions of social issues and that these discussion styles can be classified as expository, inquiry-probing and inquiry-nonprobing. In this chapter class discussions were conceptualized as a series of cognitive interaction sequences and it was argued that different teacher strategies promote different types of class interaction. For example, teachers encourage inquiry discussions by (1) using indirect influence, and (2) asking questions which call for hypotheses, definition, clarification, and grounding. It was anticipated that students in the inquiry classes would spend more time participating in the discussion than students in the expository classes. Also, it was hypothesized that inquiry-probing and inquiry-nonprobing discussions would differ in terms of the cognitive interaction following student hypotheses. In inquiry-nonprobing classes it was expected that after a student hypothesis, the teacher or students would frequently give or request additional hypotheses and positions, while in inquiry-probing classes, it was expected that the students would naturally defend their hypotheses or that the teacher would request that they do so.

Turning to teacher attitudes toward the teacher and class, it was argued that students in the inquiry classes (both probing and nonprobing) would have a higher overall evaluation of their teacher and class than students in the expository classes. On the second dimension, order and purpose, it was anticipated that students in the inquiry-probing and expository classes would rank their class higher than students in the inquiry-nonprobing classes. For the third student attitudinal scale, students in the inquiry-probing classes should feel there is a greater atmosphere of mutual respect in their class than the students in the inquiry-nonprobing or expository group.

In terms of critical thinking skills, as measured by the Harvard Social Issues Analysis Test, it was hypothesized that students in the inquiry-probing classes would perform better on the Harvard test than the students in either the expository or inquiry-nonprobing classes. Further, it was argued that students in those probing classes which exhibited considerable student spontaneous grounding have internalized the value of clarifying and supporting positions, and thus would perform exceedingly well on the social issues critical thinking test.

Chapter IV describes the procedures and instruments used to test the above hypotheses. Chapters V and VI report the findings in this study.

CHAPTER IV

PROCEDURE AND RESEARCH DESIGN

This chapter includes a description of the research design used in the study, the population, and the instruments used for collecting data. The collection of data, operational definition of variables, the statistical techniques used, and the limitations of the research design are discussed in detail.

RESEARCH DESIGN

The strategy followed in this study consisted of first classifying the classroom discussions into three groups: expository, inquiry-nonprobing and inquiry-probing, and then testing hypothesized differences between the groups on specified variables. The differences of primary interest (see hypotheses in Chapter III) concerned (a) selected interaction patterns in the dialogue, (b) the students' evaluation of the teacher and classroom climate and (c) the students' ability to think critically about social issues. The research plan involved seven steps as outlined below:

(1) Identifying a sample of teachers and classes that regularly discuss social issues. Although these teachers and students were not purposely trained to provide particular pattern of discourse, the teachers held attitudes considered conducive to the open discussion of issues.

It was anticipated that the class discussions would range from strictly expository to very reflective.

(2) Observing, taping, and categorizing the classroom interaction along dimensions which highlight differences in the reflective examination of social issues.

(3) Collecting student evaluative and critical thinking data

(4) Operationalizing and measuring the interaction variables, the student evaluation variables, and the student critical thinking variable.

(5) On the basis of definite criteria, dividing the class discussions into expository, inquiry-nonprobing and inquiry-probing.

(6) Using a one-way analysis of variance to test hypothesized differences between the groups for each of the interaction and student variables.

(7) Supplementing the tests of significance for each of the interaction variables by intensive case study descriptions of class interaction.

SAMPLE

Sixteen social studies classes in fifteen different Michigan secondary schools comprised the sample. The teachers of these social studies classes were unique in that they said that social issues instruction was important and expressed attitudes which supported the reflective examination of these issues in the classroom. The classes in the sample regularly devoted at least 25 percent of their time to the discussion of controversial issues.

The teachers and classes in the sample were identified by the project, Structure and Process of Inquiry Into Social Issues in Secondary Classrooms, directed by Byron G. Massialas, with Nancy Freitag Sprague and Jo A. Sweeney. In the fall of 1967 the project staff randomly selected 60 secondary schools in the state of Michigan and surveyed all of the biology, English, and social studies teachers in 57 of these schools. Teachers in three of the selected schools were not surveyed because the principals of these three schools did not respond to our request to provide the names of their teachers. The survey instrument, the Michigan Social Issues Teacher Questionnaire (MSITQ), developed by the project staff, dealt with many aspects of teaching social issues in the classroom.[1] For example, the teachers were asked how much time they spent discussing social issues, how controversial they considered specified issues, which issues they ordinarily discussed in the classroom, which topics they felt should not be discussed and why, and what materials they would ordinarily use for classroom units on such issues as population planning and communism. Teachers were also asked to respond to numerous attitudinal items, to differentiate between fact and opinion statements, and to provide demographic information about themselves. Of the 682 teachers who received the questionnaire, 493 or 72.3 percent completed and returned the instrument.

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[1] For a copy of the Michigan Social Issues Teacher Questionnaire see Byron G. Massialas, Nancy Freitag Sprague and Jo Ann Sweeney, Structure and Process of Inquiry Into Social Issues in Secondary Schools, Volume I, Appendix II (Project performed pursuant to contract OEC3-7061678-2942 with the United states Department of Health, Education, and Welfare, Office of Education, 1970), pp. 220-230.

From the 493 teachers who responded, the project staff sought to identify approximately 20 social studies teachers who met the following criteria:

(1) Their primary area of teaching interest was social studies.

(2) They indicated that they spent at least 25 percent of their class time discussing controversial issues.

(3) They expressed attitudes which are considered conducive to the classroom examination of social issues.

(4) They expressed willingness to participate further in our research.

Each teacher and one of his classes was to be intensively studied, including classroom visits, taping of dialogue, and collection of supplemental student and teacher data. The project staff decided whether or not a given teacher met the above criteria by examining his responses to the Michigan Social Issues Teacher Questionnaire.

The first criterion was used because the intensive gathering of data was designed to focus on a homogeneous group of teachers in terms of subject area. Since many teachers handle classes outside their subject area of primary interest and since teachers' class assignments vary, they were asked to indicate their area of primary interest, rather than the number of classes they taught in a discipline. MSITQ item 21 was used to identify social studies teachers.

> We realize some of you might have several areas of responsibility; which area would you consider to be your primary interest?
>
> (a) ___ Biology
> (b) ___ English
> (c) ___ Social Studies
> (d) ___ Coaching
> (e) ___ Other (please specify)
> ______________

One hundred and fifty of the 493 teachers were social studies teachers.

The second criterion was used in order to obtain teachers and classes who regularly examined social issues in class. MSITQ item 4 was used to identify these teachers.

> During the last month, what percentage of your total teaching time did you spend discussing issues which you considered controversial? (Please check one):
>
> ___ 0 - 10 % of teaching time
> ___ 10 - 25 % of teaching time
> ___ 25 - 50 % of teaching time
> ___ 50 - 75 % of teaching time
> ___ 75 -100 % of teaching time

The social studies teachers who responded that they had spent more than 25 percent of their teaching time during the last month discussing issues they considered controversial were retained in the sample at this point. Only 26 social studies teachers met this second criterion.

TABLE 4-1

SAMPLE CRITERION: SPECIFIED RESPONSES TO ATTITUDINAL ITEMS

Item Taken From Questionnaire	MSITQ No.	Responses of Teachers Included in the Sample
a. "Reasons for opinions should be discussed openly."	12	"strongly agree," or "somewhat agree"
b. "Keep own opinions hidden under any and all circumstances."	12	"strongly disagree," or "somewhat disagree"
c. "Each student should be encouraged to keep his opinions private."	12	"strongly disagree," or "somewhat disagree"
d. "The most important objective of instruction should lie in helping the student develop evaluation skills and critical thinking."	13	"strongly agree," or "somewhat agree"
e. "A teacher should stick to the material and schedule in the official curriculum guide."	13	"strongly disagree," or "somewhat disagree"
f. "A major responsibility of the teacher is to be accessible to the students after class."	13	"strongly agree," or "somewhat agree"
g. "The students should be taught to examine the consequences of their statements."	13	"strongly agree," or "somewhat agree"
h. "Students should be encouraged to voice their opinions on all subjects."	13	"strongly agree," or "somewhat agree"

The third criterion was applied because the project sought social studies classes which reflectively examined social issues. Several items on the MSITQ were designed to identify teachers with attitudes considered conducive to open, reflective examination of social issues. The MSITQ items and the specified responses are reported in Table 4-1.

All 26 teachers who met the first and second criteria responded in the manner specified to the attitudinal items listed in Table 4-1. Also, each of the 26 teachers expressed willingness to be involved in further research.

Because of cost and time considerations, plus the original government proposal specifications which indicated that approximately 20 teachers would be sampled, six teachers were randomly eliminated from the 26 teachers who met all four sample criteria. The elimination of six teachers left 20 teacher in the sample. When contacted, all 20 teachers agreed to participate; however, the project was unable to collect complete data from four of the teachers and their classes: one person left teaching, one teacher moved out of the state, one teacher could not continue with the research because of difficulties in the school system, and one teacher's class could not be taped because the school was located in the furthermost tip of the Upper Peninsula and distance prevented our visiting the class. This left a total of 16 teachers.

In consultation with the project staff, each teacher decided which one of his classes was to be intensively studied. A profile of the 16 teachers and their classes is shown in Table 4-2. It can be seen from this table that the demographic

TABLE 4-2

PROFILE OF TEACHERS AND CLASSES IN THE STUDY

Teacher/ Class Code	Teacher's			Type of Community	Type of School	Student's	
	Sex	Age	Teaching Experience			Grade Level	Racial-Ethnic Composition
A	Male	25	2	Suburban	Private Jr-Sr High	8	White
B	Male	23	2	Rural	Public Sr High	11-12	White
C	Male	36	10	Rural	Public Jr-Sr High	12	White
D	Male	34	14	Suburban	Public Sr High	12	White
E	Male	34	7	Suburban	Public Sr High	12	White Ethnic Groups
F	Male	27	4	Rural	Public Jr High	12	White
G	Female	24	3	Suburban	Public Jr High	8	White
H	Female	24	2	City	Public Sr High	10	60% White 40% Black
I	Female	49	25	Suburban	Catholic Sr High	11	White
J	Female	36	17	City	Catholic Sr High	12	White
K	Female	54	33	City	Catholic Sr High	12	White
L	Male	35	12	City	Public Jr High	8	White
M	Male	31	6	City	Public Sr High	12	70% White 30% Black
N	Male	24	2	Suburban	Public Sr High	12	White
O	Male	41	15	City	Public Sr High	11	White
P	Female	39	8	City	Public Sr High	12	Black

profile of the teachers and schools in the sample reflect the diversity found in American education. Five of the teachers are relative new-comers to the profession with only 2 to 3 years of experience; five of the teachers have 4 to 10 years experience; while the other six teachers have been teaching 12 years or more. The age of the teachers varies from 23 to 54, with a mean age of 33.5. Nine of the teachers are male, seven are female. The character of the schools and their locations also vary. Twelve are public schools and four are private schools. Two of the public senior high schools (D and N) and one of the junior highs (G) are located in suburban, middle class neighborhoods. One public senior high school (E) is in a suburban working class neighborhood and the school population includes many children of first or second generation immigrant families. Three of the public schools are in rural areas; one is a consolidated junior-senior high in a farming area (C), one is a junior high in a small town (F), and the third is a senior high in a small town (B). The other five public high schools are located in large cities; two serve predominately white neighborhoods (L and O); two serve racially mixed areas (H and M); and one is in a predominately black neighborhood (P). Of the four private schools, three are Catholic schools; one is located in a suburban area (I); the other two are located in the city. The fourth private school is an exclusive school with a high tuition which draws from an upper class population.

INSTRUMENTS

Three instruments were used to collect data for this study.

The verbal behavior occurring during the classroom discussions of social issues was coded using the Michigan Social Issues Cognitive Category System (Appendix B). The students' evaluations of their teacher and classroom climate were measured by their responses to the Minnesota Student Attitude Inventory (Appendix C). The Harvard Social Issues Analysis Test #2 was employed to assess the students' critical thinking skills (Appendix D).

(a) Michigan Social Issues Cognitive Category System

The Michigan Category System was developed by the Project, "Structure and Process of Inquiry Into Social Issues in Secondary Schools." The category system focuses on cognitive operations such as hypothesizing, defining, clarifying, and evidencing which are important in the reflective examination of social issues. The instrument permits one to classify spontaneous social issues classroom discourse and to analyze the sequence and distribution of patterns of interaction between members of a class. As with almost all other cognitive category systems which are fairly complex, the Michigan System is designed for use with transcripts of classroom dialogue.

Table 4-3 presents a summary of the categories and subcategories in the Michigan System. The system consists of nine basic categories, eight are cognitive (categories 1-4 and 6-9) and one is identified as non-cognitive (category 5). Categories 5 through 9 are further subdivided into more specific categories to make a total of 26. All 26 categories are defined in terms of the classroom speaker; no single category is restricted to teacher statements or student statements.

TABLE 4-3

SUMMARY OF CATEGORIES IN THE MICHIGAN SYSTEM

A. Request for Cognitive Operation

1. Exposition: The speaker requests statements which provide general information or summarize the discussion.

2. Definition and Clarification: The speaker requests statements which (a) tell how the meaning of words are related to one another, or (b) clarify a previous statement.

3. Positions and Hypotheses: The speaker requests statements which include or imply the phrases, "I believe," "I think," "I hold," "I feel," etc., followed by his hypotheses, preferences, evaluations or judgments regarding a given issue.

4. Grounding: The speaker requests reasons supporting a position or hypothesis. Requests for grounding must be clearly linked to a position-statement, hypothesis or proposed definition.

B. Non-Cognitive Operations

5. Non-Cognitive

   5.0 Request for Non-Cognitive Operation
   5.1 Directions and Classroom Maintenance
   5.2 Restatement of Speaker Ideas
   5.3 Acceptance or Encouragement
   5.4 Non-Productive Responses
   5.5 Negative Responses
   5.6 Fragmented Discussion

C. Performance of Cognitive Operation

6. Exposition: The speaker makes statements which provide general information or summarize the discussion.

   6.1 Background
   6.2 Summarizing

7. Definition and Clarification: The speaker makes a statement which (a) tells how the meanings of words are related to one another, or (b) clarifies a previous statement.

7.1 General-Stipulative
7.2 Quality-Value
7.3 Clarification

8. Positions and Hypotheses: The speaker makes statements which include or imply the phrases, "I believe," "I think," "I hold," "I feel," etc., followed by his hypotheses, preferences, evaluations or judgments regarding a given issue.

   8.1 Non-Prescriptive
   8.2 Prescriptive
   8.3 Reassessment

9. Grounding: The speaker gives reasons supporting a position or hypothesis. Grounding statements must be clearly linked to a position-statement, hypothesis or proposed definition.

   9.1 General Knowledge
   9.2 Authority
   9.3 Personal Experience
   9.4 Experience of Others
   9.5 Consequences
   9.6 Position-Taking
   9.7 No Public Grounds

Categories 1-4 are "request" categories. In these categories the speaker requests that another speaker perform a particular cognitive operation. The operations in category 5 are non-cognitive since they do not involve explicit contributions to the cognitive discourse. Categories 6-9 are cognitive categories paralleling categories 1-4. Whereas in categories 1-4 the speaker is requesting that a cognitive operation be performed, in categories 6-9 the speaker is actually performing a given cognitive operation.[2]

The unit of measurement in the Michigan System is an intellectual operation. An intellectual operation is defined as a remark or series of remarks expressing a discrete cognitive or affective operation as defined in the nine categories, regardless of time required to perform the operation.

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[2] In addition to a more detailed explanation of the categories, Appendix B includes examples and guidelines for coding classroom interaction.

(b) Minnesota Student Attitude Inventory

The MSAI was developed by Ned Flanders and his associates at Minnesota in 1961.[3] It is widely-used paper-and-pencil instrument specifically designed to measure students' attitudes toward the teacher and class. The inventory requires the student to respond on a five-point scale to 59 items. The items are statements describing teacher attractiveness, classroom climate, rewards and punishments. The student is asked to respond to each statement with "strongly agree", "agree", "undecided", "disagree", or "strongly disagree". The student's total score is interpreted as a measure of constructive attitudes toward the teacher and classwork. Estimates of the reliability of this instrument vary from sample to sample, but the median reliability is 0.85.

(c) Harvard Social Issues Analysis Test #2

The Harvard Social Issues Analysis Tests were developed by the Harvard University Social Studies Project, directed by Oliver and Shaver, and are designed to assess an individual's competence in the analysis of public controversy.[4] One of these tests is a paper-and-pencil instrument developed to assess both the student's ability to identify the substance of an argument between two individuals and his ability to select the best rebuttals to statements made in the dialogue. The test first presents an argumentative dialogue between two individuals who are debating integration in the South. Following the dialogue, the student answers a number of items with prestructured multiple choice responses.

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[3] Ned A. Flanders, Teacher Influence, Pupil Attitudes and Achievement. OE-25040 Cooperative Research Monograph No. 12. (Washington D.C.: U.S. Department of Health, Education, and Welfare, Office of Education, 1965), pp. 45-46.

[4] Donald W. Oliver and James P. Shaver, Teaching Public Issues in the High School, (Boston: Houghton Mifflin Company, 1966), Chapter Ten.

Part A of the test asks the student to pick the statement which best summarizes the argument. In Part B the student is required to evaluate summaries of the argument in terms of opposing values. Part C measures the student's ability to comprehend the substance of the argument and analyze who argued what. In Part D the student must judge which side of the argument would be supported by new information. Part E asks the student to determine the points of disagreement and select strategies which would clarify or resolve the point of disagreement.

The strength of the Harvard test is that instead of measuring various fragments of a critical thinking process, the test assesses the student's ability to follow a sequence of operations within a dialectical framework. The instrument is particularly appropriate for measuring the ability to think critically about social issues. It includes items concerned with competence in dealing with values as well as with factual and definitional disputes. The test is based on a model of reflective thinking delineated in terms of the analysis of public controversy.

There are four forms of the Argument Rebuttal and Description Test, each dealing with a different issue.[5] The composite form L and I administered in the fall of 1959 correlates .53 with the composite form F and E administered at the same time and .52 with composite form F and E administered in the spring of 1961. When the two composite forms were combined to yield one experimental variable corrected by the Spearman-Brown Formula, the estimates of reliability increase to .69 and .68, respectively.

COLLECTION OF DATA

The data for this study were collected by members of the "Inquiry Into Social Issues" Project staff during the spring and fall of 1968. Two and sometimes three visits were made to each of the 16 classes in order to collect data for the study. On the first visit the class discussion was taped by two members of the project staff. On the second and third visits the students' instruments, including the Minnesota Student Attitude Inventory and the Harvard Social Issues Analysis Test, were administered by one staff member while another member of the staff gathered supplemental data from the teacher.

Each visit was prearranged with the teacher and made at a time which was convenient for the teacher and class. The principal's office was also contacted to obtain permission for the visit. Last minute changes were sometimes unavoidable due to schedule alterations at the school (i.e., assembly programs) but staff members did not initiate any changes. Telephone contact was customarily made the day before a scheduled visit. When the researchers reached the school, they notified the principal's office.

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[5] Form I of the test was used in this study and is reproduced in Appendix D.

Since the intent of the study was to examine social issues discussions which exist in normal practice in the classroom, the teachers and classes were encouraged not to change their course of study or class routine when we visited the class for taping. Each class was taped during a normal class discussion of social issues. Special topics were not selected by the research staff; instead the teacher outlined what controversial topics were coming up for discussion and with the staff selected a day for recording the discussion.

The taping procedure is described in detail in Appendix E. Prior to beginning the class, the teacher introduced the researchers. One member of the taping team then briefly explained that the class was part of a group of social studies classes being studied by a University of Michigan research project and that the ensuing class dialogue would be recorded. The researcher stressed that no student would be individually identified when the tapes were analyzed and that they should feel free to participate as usual. After this brief explanation, the teacher took over and the class proceeded. The entire class dialogue from this point on was recorded. The discussions range from 28 to 54 minutes in length.

During the second and, if necessary, third visit the Minnesota Student Attitude Inventory and Harvard SIA Test were completed by the students. The teacher was not in the room during this time and did not have access to the student instruments. The researcher administering the instruments explained to the students the importance of honest answers and stressed that the teacher would not see their individual responses.

The teachers were provided with feedback from the Minnesota Student Attitude Inventory. The feedback consisted of a report of the distribution of responses for each item on the inventory as well as a short written summary of the overall class evaluation of the teacher. In two cases it was impossible for a staff member to go to the school to administer the student instruments. In these cases the teachers administered the instruments and instructed their students to put the completed questionnaires directly into a stamped envelope and seal it before leaving the room.

CODING THE CLASSROOM INTERACTION

The audio tapes of classroom dialogue were first transcribed, and then coders working in pairs used the Michigan Social Issues Cognitive Category System to code the 16 transcripts. Six individuals were responsible for coding the verbal dialogue. This investigator served as a coder and the coding team coordinator. One of the coders was a full-time staff member of the "Inquiry Into Social Issues" Project and the other four were doctoral students in the Social Science Research Training Program at the University of Michigan. The coders convened as a group for the first time in September 1968. At the first meeting the category system and coding procedures were explained. During the next two months the coders met weekly for one or two hours to code practice transcripts of classroom dialogue.

After two months of training and working with the category system, the coders were randomly divided into three coding teams, two coders on a team. These pairs stayed together for five months of coding. The teams used the final version of the Michigan Cognitive Category System and the technique of consensus coding to code transcribed dialogue from each of the 16 classes. Coding teams A and B each coded eight transcripts, while coding team C coded six the 16 transcripts. Six transcripts were coded twice by two different teams to check for reliability between coding pairs.

In coding the transcripted dialogue the primary unit was an intellectual operation. Every time a transition to a new intellectual operation occurred, either by the same speaker or by a new speaker, a new unit was noted. Whenever there was a shift in speakers a new unit was automatically recorded. It was mentioned earlier that the 26 categories in the Michigan System are applicable to any classroom speaker; no category is reserved for only teacher or student operations. In this study, though, it was important to know whether the teacher or a student performed a given intellectual operation. Therefore, two notations were used to indicate the speaker; "S" for students and "T" for teachers.

Figure 4-1 is an example of coded dialogue. The three columns, R, P, and NC on the left of the dialogue are the three major divisions of intellectual operations used in the Michigan Cognitive System; that is, request operations, performance operations, and non-cognitive operations. The column marked "Time" is used to indicate the amount of time (in seconds) devoted to a particular operation. T3, the first entry under R, indicates that the teacher asked that a position be taken or a hypothesis be formed. The eight seconds the teacher took to make the request is entered in the Time column. S81, the first entry under P, indicates that the student took a position or stated a hypothesis which is non-prescriptive. The first notation under the NC column, T51, indicates that the teacher provided "directions and classroom maintenance;" in this instance, he recognized a student. A slash (/) in the body of the transcript indicates that the coder recognized a transition from one unit of discourse to another.

Figure 4-1

R	P	NC	Time	
T3			8	T: What about these draft card burners? She claims they're unpatriotic. Is there anyone who thinks they're not?/
		T51	1	Janet?/
	S81		7	G: I think they're just against the draft and they're not really unpatriotic; they just don't want to be drafted./
		T51	1	T: Faye?/
	S81		3	G: No, I don't think that they're not being patriotic./
S2			3	B: Would you define what you mean by patriotic?/

The final codes for a transcript were arrived at by "consensus coding". This procedure is based on the premise that many coding disagreements may be removed if two coders are given opportunity to negotiate their disagreements.

After each coder in a pair analyzed and coded a transcript, the two coders reviewed their disagreements. The coders then tried to resolve each disagreement, if possible, and record a notation which was acceptable to both. In most cases, this type of compromise was reached and resulted in what may be called consensus coding. In those special cases where coders could not agree, each alternated in recording his own preference.

After a transcript was analyzed and consensus codes agreed upon by a coding pair, the sequence of agreed-upon codes and time spent were transferred to computer cards for further analysis.

The Scott Coefficient was used to establish reliability between coder teams. According to one author, the value of the Scott method in estimating reliability rests in the fact that it is "unaffected by low frequencies, can be adapted to percent figures, can be estimated more rapidly in the field, and is more sensitive at higher levels of reliability".[6] The formula used for calculating the Scott Index is:

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[6] Ned A. Flanders, "The Problems of Observer Training and Reliability", in Interaction Analysis: Theory, Research and Application, edited by Edmund J. Amidon and John B. Hough (Reading, Massachusetts: Addison-Wesley Publishing Company, 1967), p. 161.

$$\text{Scott Index} = \frac{P_o - P_e}{100 - P_e}$$

where P_o is the percent agreement calculated by subtracting the total percent disagreement between the two teams of coders from 100. P_e is found by squaring the average percentage of tallies in each category and summing over all categories.[7]

In the analysis of the classroom discourse, reliability checks such as the one described above were made at various intervals. In checking for reliability an entire transcript was consensus coded by two separate coding teams. The Scott Reliability Coefficients between coding teams for the selected transcripts are reported in Table 4-4.

TABLE 4-4

SCOTT RELIABILITY COEFFICIENTS

CLASS	CODING TEAMS	SCOTT COEFFICIENT
M	A & B	.74
D	A & B	.87
I	A & C	.80
H	A & C	.79
A	B & C	.85
N	B & C	.80

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[7] Byron G. Massialas, Nancy Freitag Sprague, and Jo Ann Cutler Sweeney, Structure and Process of Inquiry Into Social Issues In Secondary Schools, Volume I, Project performed pursuant to contract)EC3-7061678-2942 (Washington D.C.: United States Department of Health, Education, and Welfare, Office of Education, 1970), pp. 115-121.

A Scott Coefficient above .80 indicates a high congruence of judgment between the two coding teams in recording identical verbal behavior. In general, then, the reliability between the coding teams was quite high -- particularly when one realizes that the Scott Coefficient is sensitive to the number of categories used (i.e., the Scott Coefficient tends to decrease as the number of categories increases) and the above coefficients were calculated using 52 sub-categories.

What can be said about the validity of the Michigan Category System? Do the categories make meaningful distinctions between verbal behaviors? Does the instrument measure what it claims to measure? Cronbach points out that content validity is related to the instrument "as a set of stimuli and as a set of observing operations". The procedure used to classify operations should be specified in terms of (1) a class of stimuli and (2) rules for observing performance and reducing it to a code.[8] The Michigan Category System does specify the types of verbal behaviors which fall into given categories and has an explicit set of guidelines for the coders to follow. The high reliability between coding teams in recording identical verbal behavior indicates that the distinctions between categories are clear. That the category system makes meaningful distinctions may be seen by examining the distribution of codes for each of the 16 classes (Appendix F). Not only does each class evidence a range of tallies across categories, but also the distribution of codes varies extensively from class to class. Also when the members of the taping team were asked to characterize the dialogue in each class, their subjective evaluations confirmed in, all but one case, the distribution of operations which resulted when the interaction was coded independently by the coding teams.

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[8] Lee J. Cronbach, "Validation of Educational Measures", paper to be published in the forthcoming revision of Educational Measurement, edited by R.L. Thorndike (New York: American Council on Education, 1970).

OPERATIONAL DEFINITION OF VARIABLES

This section includes descriptions and operational definitions of the six variables calculated from the interaction data, the three attitudinal variables calculated from the Minnesota Student Attitude Inventory data, and the critical thinking variable calculated from the Harvard Social Issues Analysis Test.

(a) Interaction Variables

In order to compute the interaction variables, it was first necessary to summarize the coded sequence of interaction data for each class in a meaningful fashion. Two types of interaction matrices were used to summarize the data: an intellectual operation matrix and a timed matrix. An intellectual operations matrix shows the distribution and interrelationships among the various operations. The method of tallying the sequence of coded operations into the two types of matrices is described in Appendix F.

Interaction matrices representing the full-period of classroom dialogue were tabulated for each of the 16 classes in the study. Computer programs tallied an intellectual operation matrix and a timed matrix from class interaction data using all 52 categories and subcategories in the Michigan Cognitive System.

In addition to producing two interaction matrices based on the 52 categories, the computer programs tabulated matrices based (1) on the 18 main categories and (2) on the 16 cognitive categories. By collapsing subscripts and using only the 18 main categories, it was possible to concentrate on an 18 x 18 category matrix instead of a more cumbersome 52 x 52 category matrix. Tabulating a matrix which ignored the noncognitive categories, T5 and S5, made it possible to focus on the pattern of direct relationships among cognitive operations. Ignoring the non-cognitive categories, T5 and S5, resulted in a 16 x 16 cognitive category matrix containing 256 cells.

Six variables (i/e ratio, p/i ratio, Indirect Teacher Influence, Student Participation, Teacher Requests for Inquiry, and Probes Following Student Hypotheses) were calculated from the class interaction data. The first four were based on the timed matrices; the fifth was calculated from the intellectual operations matrices; and the sixth was based on a combination of cells in the 16 x 16 cognitive category intellectual operations matrix.

The i/e ratio was defined as the amount of time spent by the teacher and students presenting hypotheses, grounding, definitions, or clarification versus the amount of time spent by the teacher and students providing exposition. The i/e ratio was calculated by summing the class time spent in categories T7+T8+T9+S7+S8+S9 and then dividing by the amount of time spent in categories T6+S6.

P/i Ratio was defined as the proportion of inquiry time spent performing the operations definition, clarification, and grounding. The p/i ratio was computed by summing the time spent in categories T7+T9+S7+S9 and dividing by the time spent in categories T7+T8+T9+S7+S8+S9.

Indirect Teacher Influence was defined as the amount of time the teacher spent indirectly influencing the discourse by asking questions, reinforcing students and using student ideas versus the amount of time the teacher spent directly influencing the discourse by lecturing, offering his own ideas, giving directions or criticizing students. This I/D ratio is similar to the one developed by Flanders and was calculated by dividing the time spent in categories T1+T2+T3+T4+T50+T52+T53 by the time spent in categories T51+T55+T6+T7+T8+T9.

Student Participation was defined as the percentage of class time spent in categories S1 through S9.

Teacher Requests for Inquiry was defined as the total number of times the teacher asked for definitions, clarifications, hypotheses, or grounding divided by the total number of teacher operations. This variable was computed by dividing the number of operations in categories T2+T3+T4 by the total number of operations in categories T1 through T9.

Probes Following Student Hypotheses was defined as the percentage of student hypotheses followed by requesting or providing definition, clarification, and grounding without any other intervening cognitive operations. This variable was calculated by summing the operations in cells (S8, T2), (S8, T4), (S8, T7), (S8, T9), (S8, S2), (S8, S4), (S8, S7), (S8, S9) of the 16 x 16 cognitive category matrix and dividing by the total number of operations in category S8.

Appendix F shows how each of the five above interaction variables were calculated for class H.

(b) Student Attitudinal Variables

Three student attitudinal dimensions were of interest in this study: the extent to which students liked their teacher and class, the sense of order and purpose present in the class, and the students' perception of the teacher's style of discipline and control. Many of the items on the Minnesota Student Attitude Inventory were designed to tap these three dimensions. Then several factor analyses, using varimax rotation were performed on students' responses to the 59 MSAI items. One factor analysis used the entire student sample (376 students) while others used random subsamples. In some analyses the computer was directed to produce four factors, in others the computer was directed to produce five or six factors. In every analysis, three factors emerged which appeared to measure the attitudinal dimensions of interest in this study. Most of the items which consistently loaded at .45 or better on a given factor were identified á priori as being related to each other and the dimension of interest. The items which in every factor analysis consistently loaded at .45 or above on one of these three factors and had null or low loadings on the other factors are listed in Tables 4-5, 4-6, and 4-7.

TABLE 4-5

ITEMS LOADING ON THE FACTOR APPRECIATION OF THE TEACHER AND CLASS

MSAI Item Number	Statement	Loading (Using Entire Sample)
25	I really like this class.	.77
9	This teacher is one of the best I ever had.	.75
51	Sometimes just thinking about this class makes me sick.	-.71
46	This is the best teacher I have ever had.	.71
37	This teacher makes everything seem interesting and important.	.70
49	I wish I could have this teacher next year.	.69
21	This teacher makes it fun to study things.	.69
10	I just don't trust this teacher.	-.68
14	This teacher really understands boys and girls my age.	.65
6	Most of us get pretty bored in this class.	-.65
27	This teacher helps us get the most out of each hour.	.62
4	I find it easy to talk to this teacher.	.61

The first factor "Appreciation of the Teacher and Class" contained twelve items. The attitudes reflected in the statements loading positively on this factor indicate that the student likes the teacher and class. Many of these statements picture the teacher as a person who makes it fun to study, who understands students, who is stimulating and helps students get the most out of every hour. A student who strongly agrees that "this teacher is one of the best I ever had" really thinks highly of his teacher. This factor has been used by Flanders in many of his studies. Its reliability has been established at 0.86.

The second factor contained five items which reflect the degree to which order and purpose is present in the classroom. A positive response to the item loading positively on this factor, "This teacher keeps order with a fair and firm hand," indicates that the class is under control; while positive responses to statements loading negatively on the factor indicate that the class tends to fool around and waste time.

TABLE 4-6

ITEMS LOADING ON THE FACTOR
ORDER AND PURPOSE

MSAI Item Number	Statement	Loading (Using Entire Sample)
45	This class is noisy and fools around a lot.	-.78
29	In this class we fool around a lot in spite of the teacher.	-.76
18	Sometimes things "get out of control" in this class.	-.69
2	This teacher keeps order with a fair and firm hand.	.59

The third factor is very interesting, particularly when contrasted with the second factor. While the second factor measures the sense of order and purpose actually present in the class, the third factor highlights the teacher's style of maintenance and support. Educational writers have stressed the importance of a supportive classroom climate in promoting open inquiry. Do the students perceive the teacher as supportive and helpful or do they feel the teacher is unfair and authoritarian? Responses to the items on this factor probably come closest to answering this question. On one end of the dimension one envisions an impatient, punitive teacher barely enforcing order while at the other end of the dimension one envisions a helpful, non-punitive teacher who takes time to work out students' problems and has established an atmosphere of mutual respect in the class.

TABLE 4-7

ITEMS LOADING ON THE FACTOR
STYLE OF MAINTENANCE AND SUPPORT

MSAI Item Number	Statement	Loading (Using Entire Sample)
53	This teacher helps students when they have problems with their work.	.72
55	This teacher always takes time to find out your side of a difficulty.	.71
57	This teacher punishes me for things I don't do.	-.63
54	Frankly, we just don't obey the teacher in this class.	-.59
56	This teacher never pushes us or shakes us in anger.	.51
59	We behave well in this class even when the teacher is out of the room.	.46

Using the items in Tables 4-5, 4-6, and 4-7, three scales were developed to measure the factors. A student's score on a given attitudinal variable was calculated as follows:

$$\text{Score} = \sum_{1}^{p} (4(SA) + 3(A) + 2(U) + (D)) + \sum_{1}^{n} (4(SD) + 3(D) + 2(U) + (A))$$

where p = the items which load positively on the factor, n = the items which load negatively on the factor, SA = a response of strongly agree with the statement, A = a response of agree, U = a response of undecided, D = a response of disagree, and SD = a response of strongly disagree.

For the variable, "Appreciation of the Teacher and Class", a range of scores from 0-48 was possible. The higher a student's score, the more he likes the teacher and class. For the variable, "Order and Purpose", a range of scores from 0-16 was possible. A high score on this variable indicates that the student feels there is a high degree of order and purpose in the class. The scores on the variable, "Style of Discipline and Control", could range from 0-24. The higher a student's score, the greater his perception of a supportive teacher.

(c) The Critical Thinking Variable

This variable was operationally defined as the number of correct responses to items on the Harvard Social Issues Analysis Test #2. The instrument contains 22 prestructured responses. The student's total score on this test was interpreted as a measure of his ability to think critically about social issues.

DESIGN LIMITATIONS

The use of only one tape of classroom dialogue for each class was probably the most serious limitation of this study. Ideally, it would have been desirable to analyze three or four tapes per class, but time and expense made the collection and analysis of two or more tapes for each class impossible. Also, there is the question of whether or not the presence of recording equipment seriously altered the class interaction. In analyzing the tapes, one is implicitly assuming that the interaction found in one hour-long tape is characteristic of the interaction which normally takes place in that class when social issues are discussed.

In order to minimize the effects of the above limitations, every effort was made to tape "normal" class discussions. The teachers and students were encouraged not to change their course of study or class routine during taping. Special topics were not selected for discussion; instead, the teacher indicated which controversial topics were on the agenda and a day when one of these topics was to be discussed was selected for taping. There are two pieces of evidence which suggest that the one tape reflects a "normal" social issues discussion. First, half the classes were taped twice. These tapes were analyzed during the coder training sessions and the interaction in the second tape of each class is not substantially different from that present in the first tape. Also, each class was observed several times by members of the research team. Some observations took place during taping while others took place without the equipment present. The observers reported that in most instances the style of class interaction was very similar from class period to class period.

CHAPTER V

THE CLASS INTERACTION

One of the major objectives of this study was to analyze and explain social issues discussions along dimensions which emphasized the reflective examination of social issues. This chapter includes an explanation of the criteria and procedure used to classify discussions as expository, inquiry-nonprobing, and inquiry-probing. The analyses in this chapter investigate the relationship of these three general discussion styles to four specific aspects of the class interaction: teacher I/D ratios, teacher questions, student participation, and cognitive operations following hypotheses.

CLASSIFYING THE DISCUSSIONS

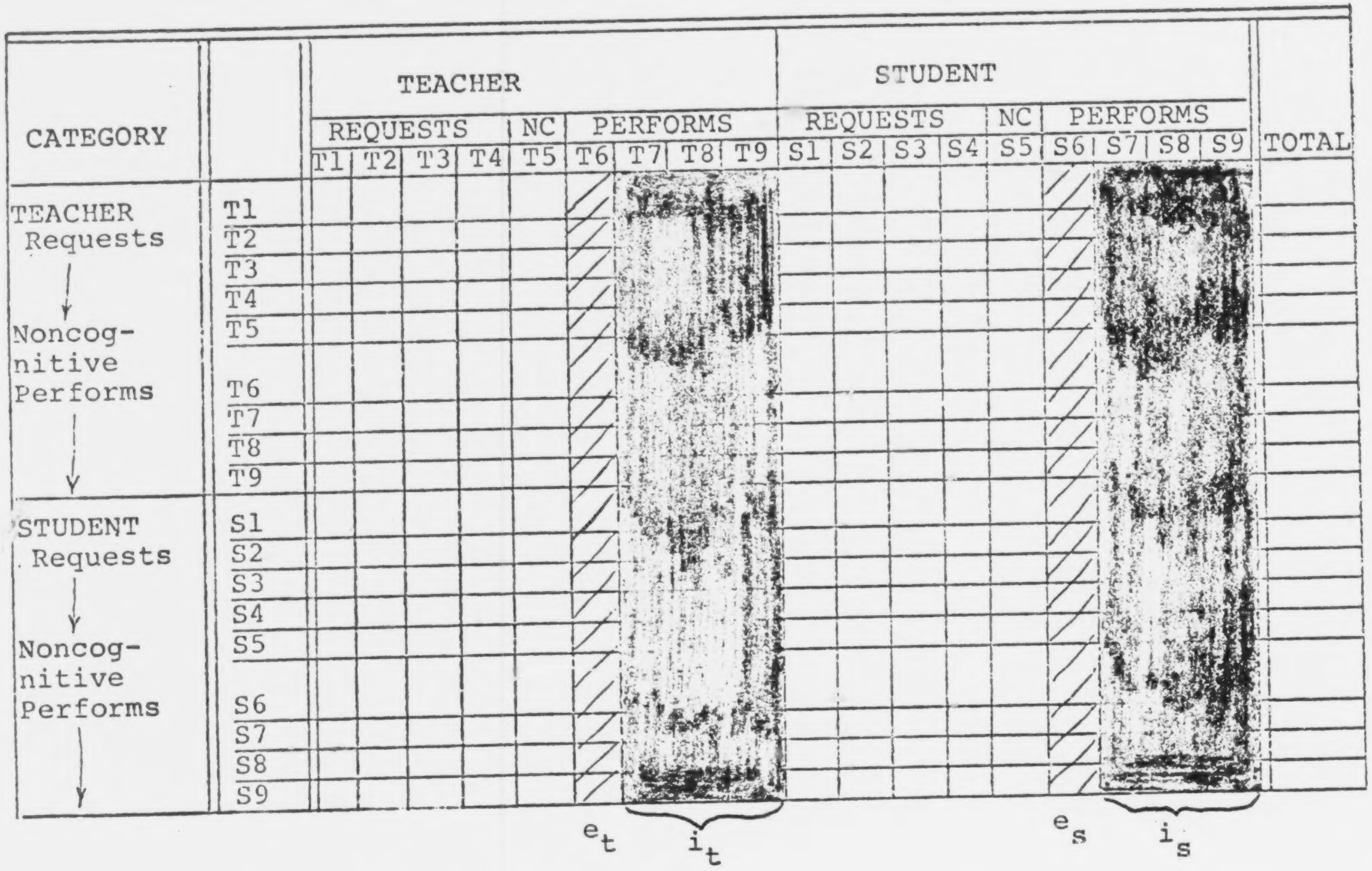
The 16 classroom discussions were divided into three groups: (1) one group concentrated on providing exposition, (2) one group concentrated on presenting but not probing hypotheses or positions, and (3) the third group stressed both presenting and probing hypotheses. Classifying the discussions was a two-step process. The i/e ratio was first used to classify discussions as expository or inquiry, and then the p/i ratio was used to further categorize inquiry discussions as probing or nonprobing.

The categories used to calculate a class' i/e ratio are shaded in the matrix in Figure 5-1. The two diagonally shaded areas labeled "e" represent teacher and student exposition, while the shaded areas labeled "i" encompass the inquiry operations performed by the teacher and students. Inquiry operations include such things as presenting hypotheses, evidence, definitions, or clarification. The subscript, t, indicates teacher performance; the subscript, s, indicates student performance. The ratio of the time devoted to operations in the areas labeled e to the time devoted to operations in the areas labeled i indicates whether the class concentrated on exposition or inquiry. An i/e ratio above 1.0 means that the class spent more time presenting hypotheses, definitions, evidence, and clarification than providing exposition, while an i/e ratio below 1.0 means that the class spent more time providing exposition. Thus, classes with i/e ratios below 1.0 were classified as expository, while classes with i/e ratios above 1.0 were classified as inquiry.

The inquiry classes were then divided into two groups; those with p/i ratios below .50 were classified as inquiry-nonprobing while those with p/i ratios of .50 or above were categorized as inquiry-probing. The p/i ratio was defined as the proportion of inquiry time (areas labeled i in Figure 5-1) spent performing the operations, definition, clarification, and grounding (categories T7,T9,S7,S9). Classes with p/i

FIGURE 5-1

CATEGORIES USED TO CALCULATE A CLASS i/e RATIO



$$\text{i/e Ratio} = \frac{i_t + i_s}{e_t + e_s}$$

ratios of .50 or above concentrated on probing while classes with p/i ratios below .50 devoted more time to generating hypotheses and positions than to probing them.

In Table 5-1 the 16 classes are listed in their respective groups along with their i/e and p/i ratios. Five class discussions were expository; that is, hypotheses were infrequently generated or tested. The i/e ratios ranged .14 to .73, with an average of .33; thus, indicating that a large proportion of time was devoted to exposition. In contrast to the expository classes, the eleven inquiry classes had an average i/e ratio of 3.77; thus, the time they spent on inquiry operations was triple the time they devoted to

TABLE 5-1

CLASSIFYING THE DISCUSSIONS

EXPOSITORY		INQUIRY-NONPROBING			INQUIRY-PROBING		
Class	I/E Ratio	Class	I/E Ratio	P/I Ratio	Class	I/E Ratio	P/I Ratio
C	.14	A	2.47	.29	H	2.25	.56
E	.16	B	6.08	.31	K	8.03	.52
F	.12	D	2.95	.32	L	5.14	.51
J	.73	G	1.89	.33	N	5.63	.50
M	.50	I	3.63	.40	O	1.74	.54
Avg	.33	Avg	3.40	.34	Avg	4.08	.56
		Avg i/e ratio = 3.77					

exposition. An analysis of variance, reported in Table 5-2, confirmed that the expository classes differed significantly from the inquiry classes on this criterion. The F-ratio was 12.46, significant at the .01 level.

Five of the discussions were characterized as inquiry-nonprobing. In these classes the participants spent most of their time hypothesizing and did not clarify or defend many of their positions. The average p/i ratio for the inquiry-nonprobing classes, .34, indicates that only a third of the inquiry time was devoted to probing operations. The five inquiry-probing classes, on the other hand, had an average p/i ratio of .56. These classes emphasized all three components of reflective thought--recognizing a problem, generating hypotheses, and probing hypotheses by testing their defensibility.

TABLE 5-2

COMPARING GROUPS ON THE CRITERION VARIABLES

ANALYSIS OF VARIANCE	CRITERION VARIABLES	
	INQUIRY DIALOGUE	P/I RATIO
1. Comparing Expository Classes To Inquiry Classes	$F_{1,14} = 12.46$**	
2. Comparing Inquiry-Nonprobing To Inquiry-Probing Classes	$F_{1,9} = .25$	$F_{1,9} = 41.47$***

*** Significant beyond the .001 level
** Significant at .01 level

Furthermore, a fairly large numerical break occurs between the p/i ratio for the highest inquiry-nonprobing class, .40 for class I, and the p/i ratio for the lowest inquiry-probing class, .50 for class N. The analyses of variance, reported in Table 5-2, confirmed that the inquiry-probing classes did not differ significantly from the inquiry-nonprobing classes on the first criterion, i/e ratio, but did differ significantly on the second criterion, the p/i ratio.

After members of the staff returned from taping a class discussion, they were asked to describe the topic(s) discussed by the class and give their subjective evaluation of the discussion. A summary of the taping team's comments and the topics discussed by each class are presented in Table 5-3. It is interesting to note that, on the whole, the observers' subjective evaluations of the discussions tend to confirm the objective criteria and method used to classify the discussions. Without exception, the five expository discussions are characterized by the observers as non-inquiry oriented. Both class C and class M discussed the world population crisis, but instead of grappling with some of the value issues involved, they confined themselves to simply reporting Malthus' views. The discussion in class E was based almost totally on the text. The students simply read or summarized passages. The very low i/e ratio, .16, for this class indicates that the students very rarely offered their own ideas or opinions. The expository class with the highest i/e ratio, J, was the only class in this group where the observers noted that some personal opinion was given.

TABLE 5-3

OBSERVERS' COMMENTS REGARDING EACH DISCUSSION

	CLASS	TOPIC(S) DISCUSSED	OBSERVERS' COMMENTS
EXPOSITORY	C	The Population Crisis	No controversy generated. The class had read Malthus and were reporting his views.
	E	Causes and Consequences of World War II	Discussion based totally on text. The teacher asked kids to read and then summarize passages.
	F	Conflicts Between Federal and State Governments	Ten case studies. Students asked to tell what a state could or could not do. Teacher accepted right answer.
	J	Immigration Quotas	Class discussed history of immigration quotas in U. S. Some personal opinion.
	M	The Population Crisis and Birth Control	Lecture-recitation. Talked about Malthus' ideas and means of cutting down birth rate.
INQUIRY-NONPROBING	A	Black Separatism	Discussion rambled extensively. The students didn't deal with the topic seriously.
	B	Drinking, Smoking, Transvesites, and Mercy Killing	Classic "bull" session. Students discussed topics pulled from a hat. No purpose or direction evident.
	D	Personal and Societal Constraints on Choosing a Mate	The students reacted to four case studies. Discussion had potential but students didn't get beyond giving their opinions.
	G	The Plight of American Indians, Negro Civil Rights	Student-led discussion. Students made very little effort to defend their ideas.
	I	Abortion and SDS	Unusual discussion. Students would take positions and somewhat defend them but there was an underlying assumption that life began at the moment of conception which inhibited much of the discussion.

TABLE 5-3 CONTINUED

INQUIRY-PROBING	H	The Draft	The students examined the fairness of the draft and discussed possible alternatives. Defended positions.
	K	The Candidates in the 1968 Elections	Considerable controversy. Students defended their choice of the best candidate.
	L	Crime in the United States	Students reacted to crime statistics. Good springboard lesson. Many hypotheses offered and explored.
	N	Vietnam and the Concept of Total War	Students evaluated whether Vietnam was a total war. Considerable use of definition.
	O	The Status of Immigrants and Blacks in Our Society	Discussed whether blacks or immigrants have more barriers to overcome. Students supported positions.
	P	Monopolies and Big Business	Class systematically discussed monopolies and their impact on black community. Students gave their opinions but depended on the teacher to guide the discussion.

Several of the discussions in the inquiry-nonprobing classes were characterized by the observers as "bull-sessions" or "rambling." Class B discussed four controversial issues in an hour--drinking, smoking, transvesites, and mercy killing. The students in this class gave all sorts of ideas and opinions but didn't attempt to delve deeply into any one of the topics. Classes B and G, according to the taping team members, were almost totally dominated by the students. The teachers in these classes, for all intents and purposes, withdrew from the discussion and made almost no effort to influence the discourse. The observers commented that the discussions in classes D and I "had potential." Each of these discussions had a clear focus and the discussants offered a number of ideas and positions but did not adequately explore them. Class I had the highest i/p ratio of any of the inquiry-nonprobing classes, .40; and it was the only class in this group where the observers commented that students attempted to defend their ideas.

In contrast to the inquiry-nonprobing classes, the taping team members specifically used the words, "defended," "supported," "evaluated," "explored," to describe the discussion in five of the six inquiry-probing classes. The observers did not apply these words to the discussion in class P, but instead noted that this class "systematically discussed monopolies and their impact on the black community." In each of the inquiry-probing classes the discussants concentrated on one issue for the entire class period. These discussions,according to the observers, evidenced a clear focus and a sense of purpose.

Having classified the discussions into three main groups, we are now ready to inquire into specific aspects of the interaction in expository, inquiry-nonprobing and inquiry-probing classes. Do teachers in inquiry classes use more indirect influence than teachers in expository discussions? How much impact do teacher questions have on the nature of the discussion?

In which classes do students participate most frequently? The remainder of this chapter is devoted to answering these questions. Before we go on, though, it is important to point out that the method used to classify the discussions did not statistically prejudice the answers to these three questions. The class discussions were classified according to the amount of time the class participants spent performing certain cognitive operations relative to other cognitive operations. The type of influence used by the teacher, the questions asked by the teacher, and the amount of student participation were not subsumed by the classification criteria.

TEACHER I/D RATIOS

It was hypothesized in Chapter III that teachers in inquiry classes would use more indirect influence than teachers in expository classes. An I/D ratio similar to the one developed by Flanders was used to measure whether teachers attempted to influence the discussion directly or indirectly. A high I/D ratio indicates that the teacher concentrated on asking questions and using student ideas, while a low I/D ratio indicates that the teacher concentrated on lecturing, giving directions and stating his own opinions and ideas. It was assumed that in expository discussions the teacher provides a majority of the exposition and only asks questions when he would like students to recall and summarize what has been previously said or fill-in information which he, as the teacher, wishes to develop in class. On the other hand, inquiry sequences depend heavily on indirect teacher influence. The teacher provides opportunities for student inquiry by asking questions which encourage students to present, probe, and test ideas. Although it is theoretically possible for the teacher to depend primarily on direct influence in an inquiry discussion (for example, he could spend the entire period stating and defending his own ideas and opinions), it was assumed that in actual practice direct influence is not the dominant teacher style in inquiry discussions.

In Table 5-4 it can be seen that teachers in inquiry discussions do, in fact, use more indirect influence than teachers

TABLE 5-4

TEACHER I/D RATIOS

EXPOSITORY CLASSES		INQUIRY CLASSES			
Class	I/D Ratio	Class	Teacher I/D Ratio	Class	Teacher I/D Ratio
C	.39	A	1.40	K	.63
E	.24	B	.98	L	.74
F	1.11	D	.49	N	1.05
J	.76	G	2.11	O	.46
M	.32	H	1.33	P	2.33
		I	.68		
Mean = .56 S.D. = .36		Mean = 1.11 S.D. = .63			

in expository discussions. The average I/D ratio for the inquiry teachers, 1.11, is almost twice as great as the average I/D ratio for the expository teachers, .56. In examining the individual classes in the table, though, it also is apparent that the I/D ratios for the individual classes vary tremendously. In the expository classes, the teachers' I/D ratio ranges from .24 to 1.11 while in the inquiry classes the I/D ratio varies from .46 to 2.33. The variance within the inquiry group is clearly greater than the variance between the groups. The large within-group variance is clearly evident in the analysis of variance presented in Table 5-5. Although the inquiry teachers use twice as much indirect influence as the expository teachers, the difference between the groups is only significant at the .10 level. Thus, it is not possible to reject the null hypothesis and accept the research hypothesis regarding teacher I/D ratios posed in Chapter III.

TABLE 5-5

ANOVA: COMPARING THE TEACHER I/D RATIOS FOR THE EXPOSITORY AND INQUIRY CLASSES

SOURCE	SUM OF SQS.	DF	MEAN SQUARES	F-RATIO
Between Groups	102.14	1	102.14	3.16(a)
Within Groups	453.18	14	32.37	
Total	555.32	15		

(a) Significant at the .10 level

How can the large variance in teacher I/D ratios be explained? Why are the I/D ratios for the teachers in expository classes F and J comparatively high and the I/D ratios for the teachers in inquiry classes D and O comparatively low? In examining the discussions in classes F and J, we find that these two teachers consistently chose not to provide background information, themselves, but instead chose to ask questions which required the students to recall or summarize information they had previously read. In class F the teacher presented ten situations regarding actions of state governments and then asked the students to tell what a state could or could not do. The following excerpt is typical of much of the discussion which took place in this class.

Codes	Dialogue
T1	T: Michigan has decided to levy a tax on all vegetables going out of the state by truck.
T51	Is that legal or illegal?/ Janet./
T61	S: Illegal. The book says it is illegal./
T1	T: Why is it illegal?
S61	S: Because the Constitution gives the Federal Government the power to regulate interstate commerce.

Class J discussed the history of immigration and immigration quotas in the United States and the teacher depended heavily on student recitation. For example,

Codes	Dialogue
T62	T: Now a couple of days ago we said that basically there were three reasons why immigrants came to this country. We said three main reasons./
T1	What might those reasons be?/
T51	Carol?/
S61	S: Freedom of religion./
T52	T: Freedom of religion./
T1	What else?/
S61	S: Political and economic freedom.

T51 T: Let's go through our book and see if we
T1 can find some examples./ 1607. What about
T51 that one./ Gary?/

S61 S: "Founding of Virginia by English colonists
to fetch treasurers, to enjoy religious
freedom, and a happy government."

Turning to the two inquiry classes in question, we find that the reason the teacher in class D had such a low I/D ratio was that he read case studies to the class. In this class, the teacher first read four actual situations where two individuals were planning to get married, and then asked the students whether they thought the marriage would work. The case studies were very extensive and a great portion of the teacher's participation consisted of reading them. Since reading is considered direct influence, teacher D had a low I/D ratio.

Class O is interesting. In this discussion the teacher did two things--he frequently gave his own opinions and ideas and he spent more time than any other teacher in the study recaping the status of the discussion. Since both these operations are categorized as direct influence, he also had a low I/D ratio.

It does not appear from the data that one can conclude with any great assurance that indirect teacher influence leads consistently to inquiry discussions. Although teachers in the inquiry classes tended to use somewhat more indirect influence than teachers in expository classes, their styles of influence varied tremendously. Also, a teacher may ask many questions, but if the questions call for student exposition, then the discussion is likely to be expository no matter how much indirect influence the teacher uses.

TEACHER QUESTIONS

A number of educators have emphasized the role of teacher questions in determining the cognitive nature of classroom discourse. For example, Sanders argues that "a certain kind of question leads to a certain kind of thinking,"[1] while Fenton states that "the types of questions a teacher asks as he leads a student to look at the logical implications of his position holds the key to success."[2] Gallagher and Aschner, in their analysis of classroom interaction, found that the number of divergent questions asked by teachers was directly related to the amount of divergent thinking exhibited in the classroom by students.[3] In a similar vein, two other educators studying the impact of teacher verbal behavior on the thinking of students in the classroom, also found that the type of teacher questions had an enormous influence on the cognitive nature of the class discussion.[4]

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[1] Norris M. Sanders, Classroom Questions: What Kind (New York: Harper and Row, 1966), pg. 8.

[2] Edwin Fenton, The New Social Studies (New York: Holt, Rinehart and Winston, 1967), pg. 44.

[3] James J. Gallagher and Mary Jane Aschner, "A Preliminary Report on Analyses of Classroom Interaction," Merrill-Palmer Quarterly of Behavior and Development, IX (July 1963), 186.

[4] Hilda Taba and Freeman F. Elzey, "Teaching Strategies and Thought Processes," Teachers College Record, LV (March 1964) 524-534.

If teachers' questions do have a major impact on the character of classroom discourse, then one would expect teachers in the inquiry classes in this study to ask significantly more inquiry questions than teachers in the expository classes. Teacher requests for inquiry may be seen graphically by referring to the shaded areas in the matrix in Figure 5-2. Area A represents teacher questions which call for definition, clarification, hypotheses, or grounding. Area B encompasses all of the teacher operations. The total number of operations in Area A over the total number of operations in Area B represents the percentage of teacher operations devoted to inquiry questions.

The proportion of inquiry questions asked by each of the 16 teachers in this study is summarized in Table 5-6. A striking characteristic of the data in this table is that every teacher in the inquiry group asked more inquiry questions than any one

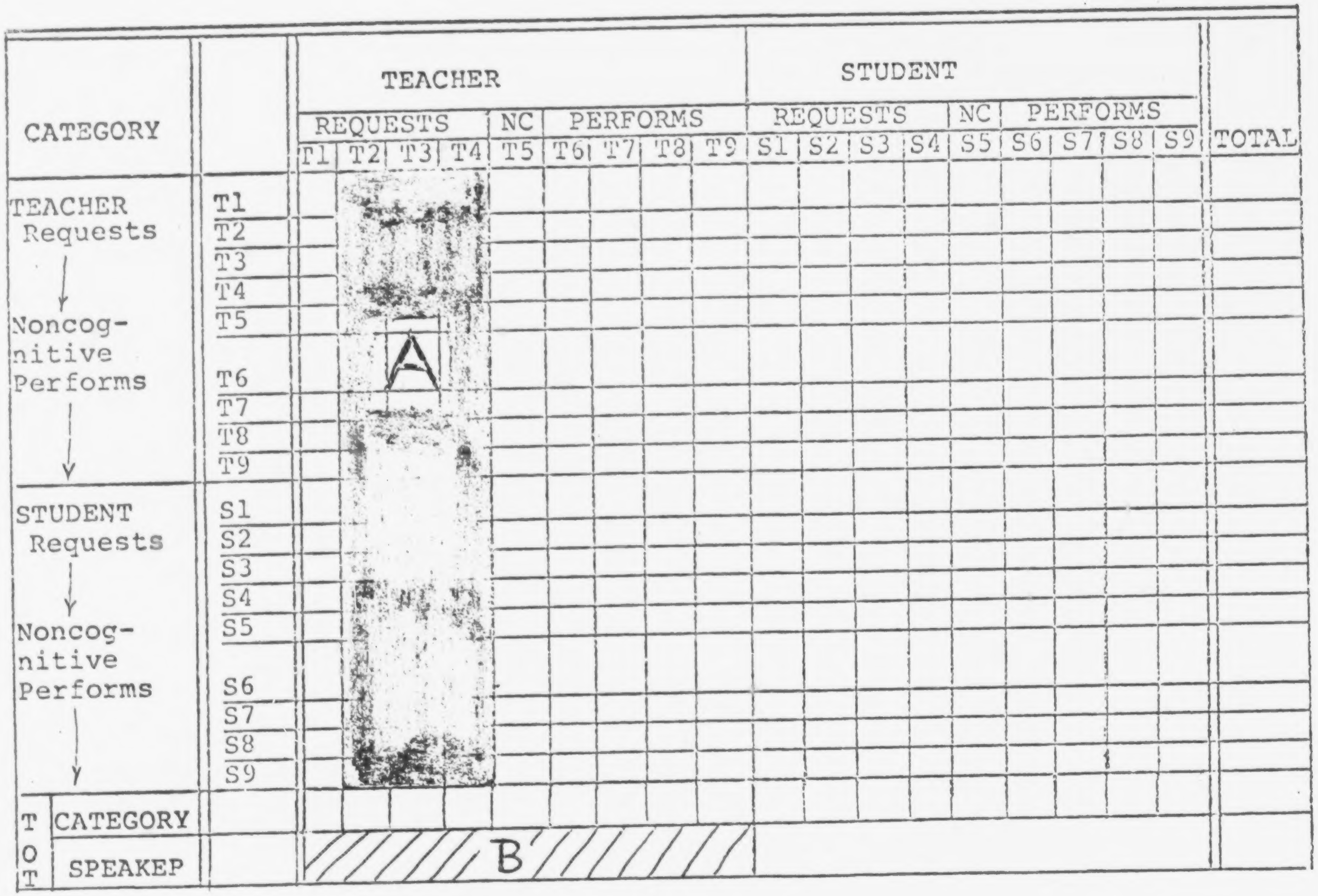
TABLE 5-6

TEACHER INQUIRY QUESTIONS

EXPOSITORY CLASSES		INQUIRY CLASSES			
Class	Inquiry Questions	Class	Inquiry Questions	Class	Inquiry Questions
C	17%	A	27%	K	32
E	7	B	31	L	30
F	5	D	26	N	29
J	12	G	28	O	23
M	13	H	33	P	30
		I	24		
Mean = 10.8% S.D. = 4.8		Mean = 28.5% S.D. = 3.2			

FIGURE 5-2

TEACHER REQUESTS FOR INQUIRY



$$\text{Teacher Requests for Inquiry} = \frac{\text{Area A}}{\text{Area B}} \quad \text{(operations)}$$

of the expository teachers. Not a single expository teacher devoted more than 17 percent of his influence to inquiry questions while no inquiry teacher apportioned less than 24 percent of his operations to inquiry questions. In the expository classes the percent of inquiry requests ranges from 5 to 17 while in the inquiry classes the range goes from 23 to 33. The average for the inquiry classes is almost triple the average for the expository classes. The dramatic difference between the two groups is further highlighted by the analysis of variance presented in Table 5-7. The F-ratio is 76.7 which is significant considerably beyond the .001 level.

TABLE 5-7

ANOVA: COMPARING TEACHER INQUIRY QUESTIONS FOR EXPOSITORY AND INQUIRY CLASSES

SOURCE	SUM OF SQS.	DF	MEAN SQUARES	F-RATIO
Between Groups	1071.41	1	1071.41	76.7***
Within Groups	195.53	14	13.97	
Total	1266.94	15		

*** Significant beyond the .001 level

It can be safely concluded from the data that teacher inquiry questions are instrumental in promoting and sustaining inquiry discourse. The teacher sets the stage by the type of question he asks, and the students perform accordingly. A teacher who desires to promote student inquiry into social issues would do well to evaluate the questions he poses during class discussions.

STUDENT PARTICIPATION

Go into a classroom and what do you hear? According to Flanders, "if someone is talking, the chances are that it will be the teacher more than 70 percent of the time."[5] Of course, this figure varies from class to class, but it does help one evaluate the amount of student participation which occurred in the classes in this study. Examining Table 5-8, we find that the average amount of student participation in the

TABLE 5-8

STUDENT PARTICIPATION

EXPOSITORY		INQUIRY-NONPROBING		INQUIRY-PROBING	
Class	Student Participation	Class	Student Participation	Class	Participation
C	07%	A	60%	H	64%
E	65	B	75	K	60
F	15	D	48	L	32
J	48	G	74	N	61
M	16	I	70	O	28
				P	36
Mean = 30.2 S.D. = 25.0		Mean = 65.4 S.D. = 11.4		Mean = 46.8 S.D. = 16.5	
		Mean = 55.3 S.D. = 16.8			

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[5] Ned A. Flanders, Teacher Influence, Pupil Attitudes, and Achievement (Washington, D.C.: U.S. Department of Health, Education, and Welfare, Office of Education, 1965), p. 1.

expository classes was very close to the figure quoted by Flanders--the students talked 30 percent of the time. The student participation in these classes, though, varied tremendously. For example, in class C the teacher completely dominated the discourse. He lectured on Malthus' ideas about the population crisis and only rarely interrupted his lecture to question students on various points. The teachers in classes E and M dominated the discussion in a similar fashion. On the other hand, the students in class E participated 65 percent of the time. In this class the students read and summarized passages from the text--not the most challenging intellectual activity, but the students did participate.

Students in the inquiry classes were more deeply involved in the class discussion than students in the expository classes. In these eleven classes the students talked an average of 55 percent of the time, an even balance between teacher and students which would please most educators. Although the amount of student participation varied from class to class, the variance in the inquiry group was not as great as that in the expository group. In only one inquiry class, O, did the teacher talk more than 70 percent of the time, and it was mentioned earlier that this teacher's participation consisted primarily of presenting four case studies to the class for their reaction. The analysis of variance in Table 5-9 indicates that the inquiry discussions included significantly more student participation than the expository discussions.

TABLE 5-9

ANALYSES OF VARIANCE: STUDENT PARTICIPATION

ANALYSIS	SOURCE	SUM OF SQS.	DF	MEAN SQUARES	F-RATIO
Expository Classes Compared To Inquiry Classes	Between Groups	2160.96	1	2160.96	5.69*
	Within Groups	5318.98	14	379.93	
	Total	7479.94	15		
Inquiry-Nonprobing Classes Compared To Inquiry-Probing Classes	Between Groups	940.15	1	940.15	4.50 (a)
	Within Groups	1880.03	9	208.89	
	Total	2820.18	10		

(a) Significant at .01 level
* Significant at .05 level

An interesting aspect of the data presented in Table 5-8 is the fact that students in the inquiry-nonprobing discussions talked more than students in the inquiry-probing classes. Although the difference is only significant at the .10 level (Table 5-9), it does provide some food for thought. A number of the inquiry-nonprobing discussions were characterized by the taping teams as "rambling" or "bull-sessions," while the inquiry-probing discussions generally evidenced a clear focus. Perhaps it was to discourage rambling and encourage students to probe and test their hypotheses and positions that teachers in the probing classes intervened more frequently in the discussion than teachers in the nonprobing classes. The students in the probing classes with relatively high student participation, classes H, K, and N, may have spontaneously grounded their positions, while the students in the three probing classes with relatively low student participation may have depended upon the teacher to get them to probe positions. This possibility will be explored further in the following section.

COGNITIVE INTERACTION FOLLOWING STUDENT HYPOTHESES

What happens after a student presents a hypothesis or states a position? It was argued in Chapter III that the answer to this question should differ in inquiry-nonprobing and inquiry-probing classes.[6]

We know, by definition, that the participants in the inquiry-probing classes spend significantly more time than the teacher and students in nonprobing classes giving reasons for their positions and clarifying and defining concepts and terms. But exactly when and how does this probing occur? It was felt that by looking at the cognitive interaction following a student hypothesis we could begin to answer this question.

Tables 5-10 and 5-11 offer information concerning the cognitive operations that occur after a student presents a hypothesis or position, S8. The classes are listed at the left of the table and the total number of student hypotheses in each class is indicated in the far right column. The operations

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[6] The expository classes are not included in this discussion; in four of these classes so few hypotheses were generated that any analysis would be meaningless.

TABLE 5-10

INQUIRY-NONPROBING CLASSES
COGNITIVE INTERACTION FOLLOWING STUDENT HYPOTHESES*

CLASS	NUMBER (AND %) OF RESPONSES IN EACH CATEGORY																TOTAL Student Hypothes.
	T1	T2	T3	T4	T6	T7	T8	T9	S1	S2	S3	S4	S6	S7	S8	S9	
A	4 (5)	7 (9)	17 (21)	3 (4)	1 (1)	-	5 (6)	-	-	2 (3)	-	-	6 (7)	1 (1)	22 (27)	13 (16)	81 (100)
B	1 (1)	6 (4)	15 (9)	5 (3)	4 (2)	2 (1)	5 (3)	-	-	2 (1)	7 (4)	-	4 (2)	-	84 (51)	30 (18)	165 (100)
D	2 (2)	5 (5)	20 (22)	3 (3)	8 (9)	-	8 (9)	-	-	-	-	-	1 (1)	1 (1)	21 (23)	23 (25)	92 (100)
G	1 (1)	-	11 (15)	-	3 (4)	-	-	-	-	2 (3)	6 (8)	-	6 (8)	-	22 (30)	23 (31)	74 (100)
I	1 (1)	4 (4)	7 (6)	1 (1)	8 (7)	1 (1)	4 (4)	1 (1)	-	2 (2)	10 (9)	5 (4)	1 (1)	3 (3)	32 (28)	33 (29)	113 (100)
Avg. Per-Cent	(2)	(4)	(14)	(2)	(5)	(1)	(4)	(0)	(0)	(2)	(4)	(1)	(4)	(1)	(32)	(24)	(100)

*Taken from a 16 by 16 cognitive category matrix

TABLE 5-11

INQUIRY-PROBING CLASSES
COGNITIVE INTERACTION FOLLOWING STUDENT HYPOTHESES*

CLASS	NUMBER (AND %) OF RESPONSES IN EACH CATEGORY																TOTAL Student Hypothes.
	T1	T2	T3	T4	T6	T7	T8	T9	S1	S2	S3	S4	S6	S7	S8	S9	
H	1 (1)	3 (4)	14 (17)	4 (5)	4 (5)	-	3 (4)	-	2 (2)	-	2 (2)	-	-	-	18 (22)	31 (38)	82 (100)
K	-	1 (1)	11 (14)	1 (1)	2 (3)	-	-	-	-	-	-	-	-	-	13 (16)	51 (65)	79 (100)
L	1 (1)	9 (13)	14 (21)	6 (9)	3 (5)	-	3 (5)	-	-	-	-	-	3 (5)	-	7 (10)	21 (31)	67 (100)
N	-	1 (2)	11 (19)	-	3 (5)	-	1 (2)	-	-	-	-	-	1 (2)	-	8 (14)	32 (56)	57 (100)
O	-	1 (3)	9 (26)	2 (6)	4 (11)	5 (14)	2 (6)	1 (3)	-	-	-	-	-	-	-	11 (31)	35 (100)
P	10 (21)	4 (8)	11 (23)	8 (17)	1 (2)	1 (2)	2 (4)	-	-	2 (4)	-	-	-	-	5 (10)	4 (8)	48 (100)
Avg. Per-Cent	(4)	(5)	(20)	(6)	(5)	(3)	(4)	(1)	(0)	(1)	(0)	(0)	(1)	(0)	(12)	(38)	(100)

*Taken from a 16 by 16 Cognitive Category Matrix immediately following the hypotheses are given in two sets of figures. The first number in each cell represents the actual number of times a student hypothesis was followed by the operation in that category, while the number in the parentheses is the percent of all cognitive operations following hypotheses which were in that category. The average distribution of responses for all the inquiry-nonprobing classes is at the bottom of Table 5-10, while the average distribution for the inquiry-probing classes is found at the bottom of Table 5-11.

Looking at the average distribution for the inquiry-nonprobing classes in Table 5-10, we find that the cognitive operation which most frequently followed a student hypothesis was another student hypothesis (S8), an operation which accounts for 32 percent of the distribution. This indicates that the same student is stating an uninterrupted series of hypotheses or another student is reacting to the first student by presenting his own hypothesis. In 18 percent of the cases the teacher and students asked for additional hypotheses (T3 and S3), while 4 percent of the time the teacher stated a hypothesis himself (T8). Thus, in over half the cases, teachers and students in inquiry-nonprobing classes reacted to a student hypothesis by giving or requesting additional hypotheses.

What about giving or asking for probing operations such as definition, clarification and grounding? In these classes 24 percent of the entries consisted of spontaneous grounding. That is, the students moved naturally from hypothesis to grounding without intervention on the part of the teacher or other students. If the student did not spontaneously defend his position, though, there was only a 3 percent chance that another member of the class would ask for grounding (T4 and S4). Six percent of the hypotheses were followed by teacher or student requests for definition or clarification (T2 and S2), while in 2 percent of the cases the students or teacher actually clarified or defined positions, concepts or terms (T7 and S7). Combining all the probing operations (T2, T4, T7, T9, S2, S4, S7, S9), we find that approximately one-third of the student hypotheses were followed by the class participants providing or requesting probing.

The reverse pattern exists in the inquiry-probing classes. In these discussions 55 percent of the student hypotheses were followed by individuals giving or asking for probing operations such as definition, clarification and grounding, while in 36 percent of the cases the teacher and students responded to a student hypothesis by offering or requesting additional hypotheses. The cognitive operation which most frequently follows student hypotheses was spontaneous grounding. Evidently, the members of these classes have made considerable progress toward internalizing a central concept in reflective inquiry; namely, defending or clarifying ideas and opinions.

In the previous section it was suggested that those probing discussions which evidenced relatively high student participation (classes H, K and N) would also contain considerable student spontaneous grounding, while those probing classes with relatively low student participation would be characterized by more frequent teacher requests for probing (classes L, O, and P). Looking again at Table 5-11 we find that, in fact, those classes with relatively high student participation did exhibit higher levels of student spontaneous grounding (38, 65, and 56 percent, respectively) than the other three probing classes (31, 31 and 8 percent). In two of these latter classes (L and P) teacher requests for probing accounted for a much larger proportion (22 and 25 percent) of the operations following student hypotheses. In classes L and P the students evidently depended on teacher questions to evoke further probing of positions.

The discussion in this section would seem to indicate that if teachers are to encourage and sustain reflective inquiry, they should be particularly aware of what happens after a student presents a hypothesis. If the student does not spontaneously support his ideas or if other students do not request that he do so, then the teacher should ask the student to support his position. Hopefully, after enough encouragement, the students will begin to naturally probe their own hypotheses and challenge other students to do likewise.

SUMMARY

It was possible in this study to identify rather distinct discussion styles centering on social issues and to categorize discussions as expository, inquiry-nonprobing and inquiry-probing. Expository classes concentrated on sharing information about the social issues in question. Inquiry-nonprobing classes devoted most of their time to giving opinions, hypotheses, and positions on issues but did not devote much time to grounding, clarifying, or testing their ideas. The members of inquiry-probing classes stressed both giving and probing their ideas and hypotheses.

In examining specific aspects of the class interaction in these three types of discussions, it was found that the level of student participation was greater in inquiry classes than in expository classes. Although teachers tended to ask more questions and use student ideas more frequently in inquiry discussions, the difference between the expository group and inquiry groups was only significant at the .10 level. The main aspect of teacher influence which distinguished expository teachers from inquiry teachers was the type of questions the teachers asked during the discussion. Inquiry teachers asked students to present hypotheses, define or clarify their terms and ideas, and ground their positions while expository teachers tended to ask questions which required the students to recall and summarize previously learned information.

Students in inquiry-nonprobing discussions participated more in the class dialogue than students in inquiry-probing classes, although the difference between the groups was only significant at the .10 level. When these two groups of classes were compared to see what happens after a student presents a hypothesis, it was found that in inquiry-probing classes student hypotheses were more frequently followed by members of the class giving or asking for probing operations such as definition, clarification and grounding, while in inquiry-nonprobing classes, student hypotheses were more frequently followed by the teacher or students giving or requesting additional hypotheses.

When the inquiry-probing classes were examined more closely, it was discovered that the six classes fell into two distinct groups. In three of the classes the students spontaneously grounded their positions, while in the other three classes the students probed and tested their ideas primarily as a result of teacher questions. In the three probing classes with relatively high spontaneous grounding, the students had evidently internalized the value of public defensibility of positions, and it was not necessary for the teacher to intervene as frequently in the discussion. Thus, the amount of student participation in these classes was as great as the amount of student participation in the inquiry-nonprobing classes. In the three probing classes with relatively low student spontaneous grounding, the teacher intervened more frequently in the discussion to ask students to probe their ideas and the total student participation was much lower.

It appears from the findings presented in this chapter that if teachers are interested in promoting the reflective examination of social issues by their students, they should (1) ask questions and use student ideas, rather than lecture, (2) concentrate on questions which encourage students to present and support their ideas, and (3) be very aware of what happens after a student presents a position; if he does not spontaneously defend his ideas or if other students do not challenge him to do so, then the teacher should ask for further clarification, evidence, or grounding.

CHAPTER VI

STUDENT ATTITUDES AND CRITICAL THINKING SKILLS

What are the students' attitudes toward the teacher and the class in expository, inquiry-nonprobing and inquiry-probing classes? Do students' evaluations of their teacher and class vary depending on the discussion style present in the class? How well do students in the three discussion groups perform on a paper-and-pencil test designed to measure their ability to think critically about social issues? Do students involved in inquiry-probing discussions attain better scores on this test than students in the other two groups? This chapter explores the answers to these questions.

STUDENT ATTITUDES TOWARD THE TEACHER AND CLASS

The instrument used to assess students' attitudes toward their teacher and class was the Minnesota Student Attitude Inventory. Selected items from this inventory formed the basis of three student attitudinal scales. The first scale concerned the extent to which students liked and appreciated their teacher and class. This scale contained items such as: "This teacher is one of the best I ever had," "This teacher helps us to get the most out of each hour," and "I really like this class." A student's score on this scale could range from 0 to 48. The second scale measured the degree to which order and purpose is present in the classroom. This scale included items such as, "This teacher keeps order with a fair and firm hand," and "Sometimes things get out of control in this class." The range for this scale was 0 to 16. The third scale included six items which assessed the student's perception of their teacher's style of class maintenance and support. Items on this scale included statements such as: "This teacher helps students when they have problems with their work," We behave well in this class even when the teacher is out of the room," and "This teacher punishes me for things I don't do." A student's score on this scale could vary from 0 to 24.[1]

(a) Appreciation of the Teacher and Class

It was hypothesized in Chapter III that students in the inquiry classes would have a higher appreciation of their teacher and class than students in the expository classes. Table 6-1 summarizes the analysis of variance for this dimension using all three groups. Table 6-2 presents the means, standard deviations, and comparisons between each of the three groups. Examining Table 6-1, we find that according to the analysis of variance there is a significant difference between the three groups. But when we study the class means in Table 6-2, we find that the direction of difference between the groups is not as predicted. Students in the expository classes have a higher overall evaluation of their teacher and class than students in the inquiry classes. The mean for

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[1] For a more complete description of the Minnesota Student Attitude Inventory and the three attitudinal scales, see Chapter IV, pp. 62, 75-79.

TABLE 6-1

APPRECIATION OF THE TEACHER AND CLASS ANOVA FOR ALL THREE GROUPS

SOURCE	SUM OF SQS.	DF	MEAN SQUARES	F-RATIO
Between Groups	817.89	2	408.94	4.35*
Within Groups	33479.17	356	94.04	
Total	34297.06	358		

* Significant at .05 level

TABLE 6-2

APPRECIATION OF THE TEACHER AND CLASS BETWEEN GROUP COMPARISONS

GROUP	N	MEAN	S.D.	COMPARISON	F-RATIO
Expository	98	33.25	8.3	Expository to Inquiry-Nonprobing	6.75*
Inquiry-Nonprobing	123	29.65	11.4	Expository to Inquiry-Probing	.55
Inquiry-Probing	138	32.40	8.8	Inquiry-Nonprobing to Inquiry-Probing	4.79*

* Significant at .05 level

the expository group is 33.25, while the means for the inquiry-nonprobing and inquiry-probing groups are 29.65 and 32.40, respectively. The difference between the expository and inquiry-nonprobing groups is significant at the .05 level while the difference between the expository and inquiry-probing groups is not significant.

Flanders has consistently found that teacher I/D ratios are positively related to students' overall evaluation of their teacher and class. In the previous chapter we found that teachers in the inquiry-nonprobing group had the highest I/D ratios, while the teachers in the expository group had the lowest I/D ratios. Although the difference between the two groups was only significant at the .10 level, one would still have expected, on the basis of the teacher's I/D ratios, that students in the inquiry-nonprobing group would like their teacher and class at least as much, if not more than students in the expository classes. Also, the findings in Chapter V indicated that students participate significantly more in inquiry-nonprobing discussions than in expository discussions; one would think that students would have a higher evaluation of classes where they are able to participate more frequently. Why were these expectations not borne out by the data in this study?

Perhaps another factor is operating -- students' prior experience with classroom discussions. Many educators have pointed out that the prevailing mode of discourse in most classes is exposition. According to one educator, cognitive-memory is the most dominant thought process for both teachers and pupils in social studies.[2] Also, several studies of classroom interaction have reported that teachers tend to ask questions which require primarily knowledge or recall responses.[3] According to Davis and Tinsley, "the accumulating evidence indicates persuasively that the major objective guiding secondary school social studies classes are those emphasizing memory and comprehension."[4] Perhaps students are conditioned to expect expository discussions in the classroom. The expect teachers to emphasize knowledge and recall and to reinforce them when they give the "right" answer. On the otherhand, students may feel ill at ease with inquiry-nonprobing discussions. Since these discussions frequently do not result in closure, the students may be uncomfortable not knowing what the "right" answer is. They may feel that they are not "learning anything" and thus evaluate these classes lower than expository classes.

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[2] James J. Gallagher, "Expressive Thought by Gifted Children in the Classroom," Elementary English, XLII (May 1965), 559-568.

[3] See, for example, Thomas H. Adams, The Development of a Method for Analysis of Questions Asked by Teachers in Classroom Discourse, doctoral dissertation (New Brunswick, New Jersey: Rutgers, The State University, 1964).

[4] O. L. Davis, Jr., and Drew C. Tinsley, "Cognitive Objectives Revealed by Classroom Questions Asked by Social Studies Student Teachers," in Teaching: Vantage Points for Study, edited by Ronald T. Hyman (New York: J. B. Lippincott Co., 1968), p. 144.

It is interesting that students in inquiry-probing classes evaluated their teacher and class almost as highly as students in the expository classes and significantly higher than students in inquiry-nonprobing classes. Certainly, the literature would seem to suggest that inquiry-probing discussions are not the norm in the classroom, so why do students exposed to these discussions evaluate their teacher and class almost as highly as students in expository classes? Massialas and Zevin have argued that the process of exploring and confirming propositions is a highly motivating activity. The quest for knowledge is viewed by these educators as intrinsicly rewarding.[5] Although students do not expect inquiry-probing discussions, perhaps when they are exposed to these discussions, they find them meaningful and interesting. Inquiry-probing discussions in contrast to inquiry-nonprobing discussions tend to have a clear sense of direction. Some closure is achieved in that, during the process of testing and probing hypotheses, students get an idea of what is an acceptable position -- it is the one which can be defended the best.

(b) Order and Purpose

Classroom teachers are frequently concerned about maintaining a sense of order and purpose in their classes. They have a low estimation of classes which are noisy and where "students fool around alot." Table 6-4 presents information regarding the students' perception of the extent of order and purpose present in their classes. Examining this table, we find that students in the inquiry-probing group and expository group ranked their classes very high on this dimension. The means for these two groups are 11.46 and 10.84, respectively. Since the highest possible average any group could attain on this scale is 12.0, it is clear that a great degree of order and purpose was present in the expository and inquiry-probing classes. The mean for the inquiry-nonprobing group (8.71), though, is considerably lower than the means for the other two groups. The analysis of variance in Table 6-3 shows that the difference between the three groups is significant, while the between group comparisons in Table 6-4 confirm that the inquiry-nonprobing group of students did, in fact, feel that there was less sense of order and purpose present in their class than did students in either the expository or inquiry-probing groups. The difference between the inquiry-nonprobing group and each of the other two groups is significant at the .001 level.

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[5] Byron G. Massialas and Jack Zevin, Creative Encounters in the Classroom (New York: John Wiley and Sons, 1967), p. 23.

Why do students involved in inquiry-nonprobing discussions think that there is less order and purpose in their class than students exposed to inquiry-probing or expository discussions? It was mentioned earlier that inquiry-nonprobing discussions tend to ramble and be somewhat like "bull-sessions." In bull-sessions the discussion can "sometimes get out of control." Participants frequently get excited and compete

TABLE 6-3

ORDER AND PURPOSE
ANOVA FOR ALL THREE GROUPS

SOURCE	SUM OF SQS.	DF	MEAN SQUARE	F-RATIO
Between Groups	524.08	2	262.04	20.61***
Within Groups	4527.09	356	12.72	
Total	5051.17	358		

*** Significant beyond .001 level

TABLE 6-4

ORDER AND PURPOSE
BETWEEN GROUP COMPARISONS

GROUP	N	MEAN	S.D.	COMPARISON	F-RATIO
Expository	98	10.84	3.5	Expository to Inquiry-Nonprobing	16.41***
Inquiry-Nonprobing	123	8.71	4.1	Expository to Inquiry-Probing	2.14
Inquiry-Probing	138	11.46	3.0	Inquiry-Nonprobing to Inquiry-Probing	38.05***

*** Significant beyond .001 level

with each other for center stage. Take for instance the following excerpt from the dialogue in Class B. The class is in the middle of a discussion about medically changing one's sex.

> S. There is something in the Bible about taking a life....
>
> S. I think it is a personal decision...
>
> S. There is nothing in the Bible about changing your sex. There are atheists in the world, too, and they don't believe in God, so thats got to kill your theory right there.
>
> T. O.K., Sandy.
>
> S. I don't think we should change our sex. If they do, you don't know if you are marrying a guy or a woman, or what you're going to marry.
>
> S. It's like taking a life. If you are put on earth as a woman, you're taking the life of a woman and making it into a man.
>
> S. It's two different lives actually.
>
> S. But a woman...
>
> S. You're changing your complete life.
>
> T. Is your body your life? That's what you're changing, isn't it?
>
> S. Well, without your body....(confusion, laughter)

In this excerpt, the students are continually interrupting one another and talking at cross purposes. One gets the feeling that in several instances a speaker isn't even listening to the previous speaker. For example, at one point a student starts to say that changing one's sex is a personal affair, but before he can finish, another student interrupts and jumps back to an earlier speaker's comment. The teacher enters the discussion twice -- once to call on a student and once to try to clear-up a point made by a student. Given just this excerpt one would be hard pressed to agree with the statement: "This teacher keeps order with a fair and firm hand." Although the above excerpt is not representative of all of the interaction which occurs in inquiry-nonprobing discussions, in examining the transcripts of class dialogue, it does appear that interaction sequences similar to the one reproduced here occur more frequently in inquiry-nonprobing discussions than in the other two types of discussions.

(c) Teacher's Style of Maintenance and Support

Maintenance refers to the means by which the teacher keeps order in the classroom. A supportive teacher maintains class order, not by yelling at pupils, but by establishing an atmosphere of mutual respect. The teacher communicates a supportive climate by reacting thoughtfully to students' comments and by helping them when they have problems with their work. The third attitudinal dimension in this study, teacher's style of class maintenance and support, assesses the extent to which students feel a supportive climate exists in the classroom.

The data summarized in Tables 6-5 and 6-6 indicate that students in the inquiry-probing group react very positively to their teacher's style of class maintenance and support. The mean for this group is 18.24, while the means

TABLE 6-5

STYLE OF MAINTENANCE AND SUPPORT ANOVA FOR ALL THREE GROUPS

SOURCE	SUM OF SQS.	DF	MEAN SQUARES	F-RATIO
Between Groups	298.57	2	149.29	9.90**
Within Groups	5370.46	356	15.09	
Total	5669.03	358		

** Significant at .01 level

TABLE 6-6

STYLE OF MAINTENANCE AND SUPPORT BETWEEN GROUP COMPARISONS

GROUP	N	MEAN	S.D.	COMPARISON	F-RATIO
Expository	98	16.85	4.0	Expository to Inquiry-Nonprobing	1.54
Inquiry-Nonprobing	123	16.14	4.6	Expository to Inquiry Probing	3.51**
Inquiry-Probing	138	18.24	3.3	Inquiry-Nonprobing to Inquiry Probing	19.56***

** Significant at .01 level

*** Significant at .001 level

for the expository and inquiry-nonprobing groups are 16.85 and 16.14, respectively. The analysis of variance for the three groups (Table 6-5) and the comparisons between groups (Table 6-6) confirm that the students in the inquiry-probing classes regard their teachers as significantly more supportive than do students in either the expository or inquiry-nonprobing classes.

Evidently, teachers in the inquiry-probing classes are very helpful and nonpunitive. The students view these teachers as sensitive to their ideas and problems. These teachers have successfully established an atmosphere of mutual respect in their classes -- an atmosphere which many educators consider essential for promoting and sustaining reflective student inquiry.

STUDENT CRITICAL THINKING SKILLS

The third question explored in this study was: how do students involved in expository, inquiry-nonprobing, and inquiry-probing class discussions perform on a written critical thinking test. The instrument used to appraise students' abilities to critically analyze social issues was the Harvard Social Issues Analysis Test #2. This test is a paper-and-pencil instrument designed to assess a student's ability to: (1) identify the substance of an argumentative dialogue, (2) judge which side of the argument would be supported by new information, and (3) select the best rebuttals to statements made in the dialogue. The test is based on a model of reflective thinking delineated in terms of the analysis of public controversy. It includes items concerned with competence in dealing with values as well as with factual and definitional disputes.

Is it possible to predict from an analysis of the classroom discussions how well students in the three groups will perform on a written critical thinking test? Let's look first at the inquiry-probing discussions. In these classes the teacher used his influence to encourage students to inquire into social issues. The students responded by identifying and clarifying problems, taking positions, and in many cases by spontaneously defending their ideas and opinions on the basis of available evidence. In those instances where the students did not naturally support or clarify their positions, the teacher intervened and encouraged them to do so. Thus, discussions in the inquiry-probing classes incorporated all aspects of the critical thinking process measured by the Harvard Test -- identifying and clarifying conflicts, taking positions, and deciding what evidence supports a given position. In class, at least, these students demonstrated the ability to deal reflectively with social controversy; therefore, there was no reason to believe that they would not score relatively well on the Harvard Critical Thinking Test.

On the other hand, after analyzing the discussions which took place in the inquiry-nonprobing classes, one would have to conclude that students in these classes would score relatively low on the Harvard Test. The teachers in these classes also provided an opportunity for students to inquire into social issues, but these students responded only by stating their positions, ideas, and opinions, not by defending their ideas. Granted, the teachers in these classes did not ask students to clarify or support their opinions, but the fact that the students almost never probed hypotheses on their own indicates that they have not internalized the cognitive skills involved in evaluating evidence and supporting positions.

It is impossible to predict from an analysis of the expository discussions how well students in these classes will perform on the Harvard Test. Students in these classes did not have an opportunity to inquire into social issues; instead they concentrated on exposition. Thus, we have no idea from the discussion what cognitive skills, beyond knowledge and recall, the students possess. Certainly, though, these students were not encouraged to demonstrate or develop their critical thinking skills during the class discussion, and one would tend to hypothesize that they would not do as well on the Harvard Test as the students in the inquiry-probing classes.

Did the students in the inquiry-probing group perform better on the Social Issues Analysis test than the students in the expository and inquiry-nonprobing groups? The answer may be found by examining the data in Tables 6-7 and 6-8.

The analysis of variance for all three groups in Table 6-7 indicates that there is a significant difference between the three groups. In Table 6-8 the mean of the inquiry-

TABLE 6-7

THE HARVARD SOCIAL ISSUES ANALYSIS TEST ANOVA FOR ALL THREE GROUPS

SOURCE	SUM OF SQS.	DF	MEAN SQUARES	F-RATIO
Between Groups	219.56	2	109.78	14.73***
Within Groups	2256.08	343	7.45	
Total	2775.64	345		

*** Significant at .001 level

TABLE 6-8

HARVARD SOCIAL ISSUES ANALYSIS TEST BETWEEN GROUP COMPARISONS

GROUP	N	MEAN	S.D.	COMPARISON	F-RATIO
Expository	94	10.51	2.5	Expository to Inquiry-Nonprobing	9.24**
Inquiry-Nonprobing	123	9.38	2.9	Expository to Inquiry-Probing	4.10*
Inquiry-Probing	129	11.24	2.8	Inquiry-Nonprobing to Inquiry-Probing	27.53***

* Significant at .05 level
** Significant at .01 level
*** Significant beyond the .001 level

probing group is 11.24, the mean of the expository group is 10.51, and the mean of the inquiry-nonprobing group is 9.38. Looking at the comparisons in this table, we find that the students in the inquiry-probing classes did score significantly higher on the Harvard Test than did the students in either of the other two groups. The difference between the inquiry-probing group and the inquiry-nonprobing group is significant beyond the .001 level, while the difference between the inquiry-probing and expository groups is significant at the .05 level. The comparison between the expository group and the inquiry-nonprobing group indicates that the expository students also performed significantly better than the inquiry-nonprobing students on the critical thinking test; the difference between the two groups is significant at the .01 level.

Clearly, students in the inquiry-probing group performed significantly better on the written critical thinking test than students in the other two groups. Since the Harvard Test measures many of the same aspects of reflective thought which were present in the inquiry-probing discussions, but which were not evident in the other two types of discussions, these results are not surprising. The fact that the students in the expository classes scored better than the students in the inquiry-nonprobing classes is also not unexpected. We knew that students in the nonprobing classes had trouble reflectively examining social issues, but the students in the expository classes were a complete mystery. Apparently, some of these students do have the ability to deal reflectively with social issues. How they obtained these skills is an unanswered question.

In Chapter V it was pointed out that three of the inquiry-probing discussions evidenced considerable student spontaneous grounding (classes H, K, and N) while students in the other three classes (Classes L. O. and P) depended upon teacher questions to evoke further probing of positions. Since students who spontaneously defend their positions demonstrate the ability to select information which will support their arguments, one would expect these students to have a relatively easy time judging which side of an argument would be supported by new information -- a skill which is emphasized by the Harvard Test.

The data presented in Table 6-9 confirm the above prediction. The mean score for students in probing classes which evidence high spontaneous grounding is 12.70, while the mean score for the students in probing classes which evidence low spontaneous grounding is 9.97. The difference between the two groups is significant beyond the .001 level. Also, it is important to note that the students in the classes which exhibit low spontaneous grounding performed only slightly better on the Harvard Test than the students in the inquiry-nonprobing classes and slightly worse than students in the expository classes. Evidently, it is not just the fact that students are involved in inquiry-probing discussions which helps predict their performance on the Harvard Test,

TABLE 6-9

HARVARD SOCIAL ISSUES ANALYSIS TEST
COMPARING HIGH SPONTANEOUS GROUNDING AND LOW
SPONTANEOUS GROUNDING GROUPS

SOURCE	SUM OF SQS.	DF	MEAN SQUARES	F-RATIO
Between Groups	239.01	1	239.01	41.10***
Within Groups	738.54	127	5.82	
Total	977.55	128		

Mean of High Spontaneous Grounding Group = 12.70
Mean of Low Spontaneous Grounding Group = 9.97

*** Significant beyond the .001 level

but, more importantly, it is the amount of student spontaneous grounding which occurs during the discussion which is the best predictor. Apparently, students who depend on the teacher to help them probe positions in class have trouble analyzing social controversy when the teacher is not around to help them.

SUMMARY

The students in this study who were involved in expository discussions had a relatively high evaluation of their teacher and class. Apparently, students have been conditioned to expect expository discussions. They feel this type of discourse exhibits a high degree of order and purpose, and are secure in the knowledge that they are giving the right answer. On the other hand, it is clear that students do not like inquiry-nonprobing discussions. These classes received the lowest evaluation relative to the other two groups on all three student attitudinal dimensions. Evidently, students see these classes as lacking order and purpose and react negatively to the rambling nature of the discussion.

The students who participated in the inquiry-probing discussions liked their teacher and class almost as much as the students in the expository classes. They feel these discussions have a sense of order and purpose and react very positively to their teacher's style of maintenance and control. The teachers in these classes successfully established a supportive climate in the classroom.

Turning to the three groups' performance on the Harvard Social Issues Analysis Test, we found that students in the inquiry-probing classes performed significantly better on this test than students in either of the other two groups. The students in the probing classes which had considerable spontaneous grounding did particularly well on the critical thinking test. Apparently, they had progressed further than the other students in internalizing the value and skill of supporting and evaluating positions and hypotheses. This data would seem to indicate that if teachers are seriously interested in helping students improve their critical thinking skills, they must encourage students to spontaneously ground their own positions and challenge their fellow students to do likewise. It is imperative that students develop autonomy in the analysis of social controversy if they are to transfer this skill to other arenas.

CHAPTER VII

CONCLUSIONS AND IMPLICATIONS

The central concern of this study was to determine effective teaching strategies and practices in classroom discussions of social issues. The literature suggests that, traditionally, social issues have either been totally neglected in secondary school classrooms or have been dealt with uncritically. For the purposes of this study, teaching effectiveness was evaluated in terms of the critical thinking skills of participating students and their attitudes toward the teacher and class.

The data for this study were obtained from 16 social studies classes in Michigan. The teachers of these classes constituted a purposive sample of Michigan secondary school teachers who (a) regularly discussed social issues in their classes and (b) expressed themselves in support of the reflective examination of these issues in class. The students in each class were given a battery of tests and the class was taped at least twice while social issues were being discussed.

The instruments used for ascertaining the students' critical thinking skills were (a) the Michigan Social Issues Cognitive Category System and (b) the Harvard Social Issues Analysis Test. The instrument used to determine student attitudes toward their teacher and the classroom environment was the Minnesota Student Attitude Inventory. The Michigan Category System is an observation instrument which allows one to classify the verbal interaction which takes place in a classroom. The system focuses on cognitive operations such as definition and clarification, hypothesis formation or position taking, and grounding. These operations are central to the reflective examination of social issues. The system was used to analyze tapes collected in the 16 classes in the sample. The Harvard Social Issues Analysis test is designed to measure a student's ability to identify the substantive points in an argument, determine which positions in the argument can be supported by given evidence, and select the best rebuttals to various positions taken during the discussion. The Minnesota Student Attitude Inventory assesses student attitudes toward the teacher and class. This instrument measures several attitudinal dimensions, including whether or not the students like their teacher, their evaluation of his teaching style and his system of rewards and punishments.

In the initial analysis of the coded transcripts it became apparent that distinct discussion styles existed and that these styles could be logically categorized into three groups: expository, inquiry-nonprobing, and inquiry-probing. Expository classes concentrated on sharing background information about the social issues in question without presenting or examining alternative positions. In inquiry-nonprobing classes the participants devoted most of their time to giving opinions, suggesting hypotheses and taking positions on issues but did not devote much time to grounding, clarifying, or testing their ideas. The members of the inquiry-probing classes stressed the development of new ideas as well as their clarification and verification. It was this three-fold classification of the classes that provided the overall framework for the remainder of the study.

FINDINGS

The study explored a number of hypotheses regarding various aspects of the class interaction and the relationship of the discussion styles to student critical thinking skills and their attitudes toward the classroom setting. In this section each hypothesis is presented, the instrument used to collect data for the analysis is noted, and the findings associated with each hypothesis are reviewed.

Hypothesis 1: Teachers in inquiry classes will use more indirect influence than teachers in expository classes. (Michigan Social Issues Cognitive Category System)

This hypothesis was not supported at the .05 level of significance. However, certain observations can be made about the importance of I/D ratios. Since no inquiry teacher had an I/D ratio of less than .46 and the average I/D ratio for these teachers was 1.11, it appears that a minimum amount of teacher indirect influence is necessary if students are to participate in the discussion. A teacher who has a very low I/D ratio tends to dominate the class by lecturing. In the analysis of the class interaction we found that three of the five expository teachers did just this; their I/D ratios were .24, .32, and .39. Two of the expository teachers did ask students to participate but in a limited way. While the above hypothesis was not supported at a statistically significant level, the evidence did indicate that there is an overall tendency for teachers in inquiry classes to have higher I/D ratios than expository teachers.

Hypothesis 2: Teachers in inquiry classes will ask more open-ended, nonexpository questions than teachers in expository classes. (Michigan Social Issues Cognitive Category System)

This hypothesis was supported beyond the .001 level of significance. Not a single expository teacher devoted more than 17 percent of his operations to inquiry questions while no inquiry teacher apportioned less than 24 percent of his operations to inquiry questions. Obviously, inquiry teachers minimize questions of recall and background information and emphasize questions which encourage students to develop their own ideas as they deal with the subject at hand.

Hypothesis 3: There will be more student participation in inquiry classes than in expository classes. (Michigan Social Issues Cognitive Category System)

This hypothesis was supported at the .05 level of significance. Clearly, inquiry teachers of both types encourage student participation in their classes to a greater degree than do the teachers in expository classes. The students in the expository classes approached the participation average found by Flanders in his studies of classroom interaction. However, students in the inquiry classes participated considerably more than the average noted by Flanders. In this study students in the inquiry classes participated on the average 55 percent of the time as compared to the norm of 30 percent found by Flanders. There is a tendency for inquiry-nonprobing students to participate more than inquiry-probing students, although the difference between the two groups is not statistically significant. This tendency in itself is important but one must also take into account the quality of the students' cognitive performance in the inquiry-nonprobing classes.

Hypothesis 4: After a student presents a hypothesis, the following will occur more frequently in inquiry-probing classes than in inquiry-nonprobing classes: (a) the student will spontaneously defend or support the hypothesis, (b) the teacher will request that the hypothesis be probed, and (c) other students will request that the hypothesis be probed. (Michigan Social Issues Cognitive Category System)

We know that the participants in the inquiry-probing classes spend more time than the teacher and students in nonprobing classes giving reasons for their positions and clarifying and defining concepts and terms. But when and how does this probing occur? In a sense, the above hypothesis provided direction for search, rather than grounds for a statistical test. In three of the probing classes it was found that frequently the students, themselves, spontaneously supported or clarified their opinions while in the other three probing classes it was observed that the students did so only after the teacher specifically asked for evidence or clarification. On the other hand students in the inquiry-nonprobing classes rarely moved naturally from position-taking to grounding nor did their teacher intervene and ask them to support their ideas.

Hypothesis 5: The students in the inquiry classes will have a higher overall evaluation of their teacher and class than students in the expository classes. (Minnesota Student Attitude Inventory)

This hypothesis was not statistically supported. It was found that students in inquiry-nonprobing classes evaluated their teacher and class significantly lower than did students in either the expository or the inquiry-probing classes. Perhaps the relatively low evaluation of the inquiry-nonprobing classes may be explained by prior student conditioning; students may expect their teachers to provide closure or the "right answer." When this does not take place, the students may feel insecure and have a tendency not to like the classroom setting. Possibly an instrument which is more specific about particular aspects of teacher performance -- for example, freedom to explore one's own ideas -- would result in different student evaluations.

Hypothesis 6: The students in the inquiry-probing classes will feel more positively toward their teacher's style of class maintenance and support than the students in expository or inquiry-nonprobing classes. (Minnesota Student Attitude Inventory)

This hypothesis was supported at the .01 level of significance. Students in the inquiry-probing classes reacted more positively to their teacher's style of maintenance and support than did the students in the expository or inquiry-nonprobing classes. It is difficult to attribute this finding directly to the existence of teacher and student probing. More likely, this type of attitude was established early and not only facilitated student reflection but was continually reinforced by the joint effort of teacher and students to critically analyze social issues.

Hypothesis 7: The students in the inquiry-probing classes will feel that more order and purpose is present in their class than the students in the inquiry-nonprobing classes. (Minnesota Student Attitude Inventory)

Hypothesis 8: Students in the expository classes will feel that there is more order and purpose present in their class than students in the inquiry-nonprobing classes. (Minnesota Student Attitude Inventory)

Both these hypotheses were supported by the data beyond the .001 level of significance. Inquiry-nonprobing students feel their class is the least purposeful and organized whereas inquiry-probing students feel that their class is the most purposeful and organized. It appears that students in the inquiry-probing classes like the purpose associated with examining and testing ideas while students in the expository classes like the order and direction involved in furnishing background information and the "right answer." Students in the inquiry-nonprobing classes evidently react to a lack of purpose and teacher initiative in exploring ideas. To them the classroom may symbolize an aimless or haphazard milieu perhaps like the traditional and often criticized "Progressive Education" setting.

Hypothesis 9: The students in the inquiry-probing classes will perform better on the social issues critical thinking test than the students in the inquiry-nonprobing classes. (Harvard Social Issues Analysis Test)

Hypothesis 10: The students in the inquiry-probing classes will perform better on the social issues critical thinking test than the students in the expository classes. (Harvard Social Issues Analysis Test)

Both of these hypotheses deal with critical thinking. Hypothesis 9 was supported at the .001 level of significance, and hypothesis 10 at the .05 level of significance. Students in inquiry-probing classes performed better than either of the other two groups. Perhaps two factors were operating in the inquiry-probing classes: one, the students were given an opportunity to demonstrate their inquiry skills and two, the teacher, as shown in the interaction data, encouraged them to support and critically analyze their ideas and positions. In the inquiry-nonprobing classes students were given the opportunity to explore ideas but, either through lack of skill on their part or failure of the teacher to intervene with appropriate questions, they did not engage in reflective inquiry. In the expository classes students were not given the opportunity to deal with social issues in their own terms; however, some of the students in these classes may have had experience critically examining social issues in other settings and this may account for the fact that these students performed better than the inquiry-nonprobing students on the critical thinking test.

Hypothesis 11: The students in the inquiry-probing classes which have a high incidence of spontaneous student grounding will perform better on the critical thinking test than students in the inquiry-probing classes which do not have a high incidence of spontaneous student grounding. (Harvard Social Issues Analysis Test)

This hypothesis was supported by the data beyond the .001 level of significance. Spontaneous grounding by students seems to be a good predictor of critical thinking ability. It appears that this type of student has internalized the value of supporting positions on social issues or claims-to-knowledge and does not need prompting from the teacher.

IMPLICATIONS AND RECOMMENDATIONS

Most of the educational literature lumps inquiry-probing and inquiry-nonprobing behavior together. The findings of this study indicate that these two types of performance are dramatically different when student outcomes are measured. On all attitudinal dimensions students consistently evaluated inquiry-nonprobing classes relatively low and the students in these classes did poorly on the critical thinking test. On the other hand, students in the inquiry-probing classes rated their classes much higher and did very well on the critical thinking test. For both pedagogical and research purposes these two types of classrooms need to be kept separate.

If both inquiry-probing and inquiry-nonprobing instruction are grouped together, their opposite effects on student outcomes will cancel each other out. This methodological pitfall perhaps accounts for numerous studies in this field which show no significant difference between the effects of inquiry versus expository types of instruction. Researchers need to carefully analyze the classroom discourse in order to establish whether or not all the elements of inquiry instruction are present. What often passes as inquiry is simply a great deal of student participation and talk, rather than an intensive and systematic analysis of social issues. It is important to keep in mind that reflective inquiry has a sustained focus which is achieved through the systematic use of hypothesis formation and testing.

There has been a tendency for studies in the past to rely on teachers' own reports of what they do in the classroom. All of the teachers in this study specifically indicated that they dealt critically with social issues but an analysis of the interaction data indicated otherwise. According to these data only six out of the 16 teachers performed in a reflective manner. Future studies should not rely on student or teacher self reports but on the judgment of independent observers or data obtained through a category system.

Several investigations have used an I/D ratio as a measure of a teacher's style of influence. It has been assumed that a teacher with a high I/D ratio promotes more student participation and interaction than a teacher with a low I/D ratio. Yet the findings in this study indicate that a teacher can ask many questions and thus have a high

I/D ratio while still maintaining very tight control of class discussion. For example, a teacher who consistently asks questions which require the students to simply recall or summarize information does not allow students to explore and test their own ideas. Simply asking questions is not enough. The questions need to be of a high cognitive level and go beyond the level of mere memory and recall of information. In sum, it is very misleading to evaluate the quality of a classroom simply by reference to a teacher's I/D ratio.

Teachers who wish to maximize the conditions for inquiry need to encourage students to (1) internalize the value of grounding and clarifying their positions, (b) develop skill in relating the position to appropriate grounds in the form of evidence and logical implications, and (c) provide grounds and clarifications of positions spontaneously. When spontaneous grounding occurs, it may be safely said that students have reached a relatively high level of skill and that this ability can most likely be transferred to situations outside the classroom.

APPENDIX A

STRUCTURE AND PROCESS OF INQUIRY INTO SOCIAL ISSUES IN SECONDARY CLASSROOMS PROJECT ABSTRACT

STRUCTURE AND PROCESS OF INQUIRY INTO SOCIAL ISSUES PROJECT ABSTRACT[1]

The main purpose of this project is to record and analyze classroom discourse when social issues are discussed. Controversy stimulates emotional reactions and involves the examination of personal values. It is the intent of this study to investigate how emotional reactions are affected by certain intellectual operations and value judgments, and to probe the role of the teacher in the rational examination of social issues. In more specific terms, the objectives of the study are:

1. To gain information from secondary school teachers of biology, English, and social studies in Michigan about their attitudes toward and methods of dealing with social issues in their classrooms.

2. To more clearly define the role of the teacher in critically examining social issues within the classroom environment.

3. To develop a category system for analyzing discourse in the social studies classroom. This category system will be especially sensitive to the presence or absence of logical thought processes in the resolution of an emotionally charged issue.

A probability state-wide sample of biology, English, and social studies teachers will be contacted through a mail questionnaire to gain information about the present treatment of social issues in their classes. This information will allow us to select the teachers to be included in the second phase of the project. During the second phase, tape recordings of several social studies classrooms will be transcribed and analyzed in order to develop a category system which hopefully will enable one to discriminate between types of discourse which effectively handle social issues in the classroom environment.

On its completion, the study is expected to obtain the following results: (1) Substantial information on the present treatment of social issues in secondary schools in Michigan; (2) An extensive category system that will distinguish between levels and types of discourse centered on social issues; (3) Secondary results which may result from the development of the category system could include (a) a clearer theoretical understanding of the role of the teacher in providing an appropriate atmosphere for the discussion of social problems,(b) the possible identification of teaching strategies which may help teachers and students develop more skill in handling value-related issues, (c) the beginnings of a model for possible revision of the social studies curriculum of secondary schools.

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[1] This project was performed pursuant to contract OEC3-7-061676-2942 with the United States Department of Health, Education, and Welfare, Office of Education. Byron G. Massialas, Project Director, with Nancy Sprague and Jo A. Sweeney.

APPENDIX B

MICHIGAN SOCIAL ISSUES COGNITIVE CATEGORY SYSTEM

MICHIGAN SOCIAL ISSUES COGNITIVE CATEGORY SYSTEM[2]

I. Unit of Measurement (two simultaneous units)

A. Intellectual Operation: The primary unit of measurement is an intellectual operation in the classroom. This unit is based on a single and complete cognitive or affective operation as defined in the nine categories, regardless of time required to perform the operation. Everytime a transition to a new intellectual operation occurs, either by the same speaker or by a new speaker, a new unit is noted.

Speaker: Whenever there is a shift in speakers, a new unit is noted. There are two notations for speakers:

S = student speaking

T = teacher speaking

II. The Categories

Categories 1-4 indicate that the speaker is requesting that a particular cognitive operation be performed. Categories 6-9 are parallel categories which indicate that the speaker is actually performing the particular cognitive operation. Category 5 is a noncognitive category.

A. Request for Cognitive Operation

1. Exposition: The speaker requests statements which provide general information or summarize the discussion.

Exs.: "What were the terms of the Compromise of 1850?"

"What did your textbook say about the causes of the population explosion?"

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[2] This instrument was developed by the project, Structure and Process of Inquiry into Social Issues in Secondary Classrooms pursuant to contract OEC3-7-061678-2942 with the United States Department of Health, Education, and Welfare, Office of Education, Byron G. Massialas, Project Director, with Nancy Sprague and Jo A. Sweeney.

2. Definition and Clarification: The speaker requests statements which (a) tell how the meaning of words are related to one another or (b) clarify a previous statement.

   Exs.: "Define what you mean by democracy."

   "When you said 'that treaty,' were you referring to the Treaty of Versailles?"

3. Positions and Hypotheses: The speaker requests statements which include or imply the phrases, "I believe," "I think," "I hold," "I feel," etc., followed by hypotheses, preferences, evaluations or judgments regarding a given issue.

   Exs.: "Do you think burning draft cards is wrong?"

   "What are some possible reasons for violence on college campuses?"

4. Grounding: The speaker requests reasons supporting a position or hypothesis. The request for grounding must be clearly linked to a position statement, hypothesis, or proposed definition.

   Ex.: "Why do you think 18-year olds should vote?"

B. Non-cognitive Operations

5.0 Request for Non-cognitive Operations - The speaker requests (1) information concerning students, classroom procedure or operation, or (2) that an individual repeat a previous statement.

Exs.: "Where is Joanne?"

"Did we talk about this yesterday?"

"Would you repeat that?"

"What did you say?"

5.1 Directions and Classroom Maintenance - The speaker calls upon an individual to speak or make statements regarding classroom procedure or operation.

Exs.: "Sue, you had your hand up."

"Now we will move on to the next question."

5.2 Restatement of Speaker Ideas - The speaker paraphrases or restates a statement made by a previous speaker or himself.

Ex.: "As John noted, the balance in the Senate changed."

5.3 Acceptance or Encouragement - The speaker makes statements which indicate that the individual should continue his behavior.

Ex.: "You've brought up a good point."

5.4 Non-Productive Responses - The speaker indicates an inability or unwillingness to respond to a request or perform the task.

Ex.: "I don't know the answer to that question."

5.5 Negative Responses - The speaker makes irrelevant or disruptive statements, corrects or states the inappropriateness of a speaker's statement.

Exs.: "Sue, I don't think you were listening."
"Bob always liked girls with green hair."

5.6 Fragmented Discussion - A period which cannot be categorized because the statement or statements cannot be understood.

Ex.: "Ah, well..."

C. Performance of Cognitive Operation

6. Exposition: The speaker makes statements which provide general information or summarize the discussion.

6.1 Background - The speaker makes statements providing general information by explaining or elaborating upon material.

Ex.: "A fellow in the United States registers for the draft on his eighteenth birthday."

6.2 Summarizing - The speaker makes statements reviewing the progress of discourse. The speaker is doing more than paraphrasing another speaker but is also integrating previous discussion.

Ex.: "Let's see if I can tie this discussion together. Two major points have been mentioned--first, that world-wide birth control may be necessary if we are to control the population explosion and secondly, that when planning birth control programs, we must consider the religious orientations of the community or country involved."

7. Definition and Clarification: The speaker makes a statement which (a) tells how the meaning of words are related to one another or (b) clarifies a previous statement.

7.1 General-Stipulative - The speaker provides a generally accepted or contextual definition of words for class use.

Ex.: "A slave is a person who is held in servitude as the property of another person."

7.2 Quality-Value - The speaker provides a definition of words which have judgmental or prescriptive connotations.

Ex.: "A good citizen is a person who exercises his voting responsibilities."

7.3 Clarification - The speaker makes statements clarifying the meaning of previous statements.

Ex.: "When I said 'country,' I was only referring to the United States."

8. Positions and Hypotheses: The speaker makes statements which include or imply the phrases "I believe," "I think," "I hold," "I feel," etc., followed by his hypotheses, preferences, evaluations or judgments regarding a given issue.

8.1 Non-prescriptive - The speaker makes statements of position which, once the elements in the statement are defined, could be validated by factual evidence and/or reference to empirical reality.

Ex.: "I think blacks are not given as equal medical treatment as whites in the United States."

8.2 Prescriptive - The speaker makes statements regarding what ought, or should be.

Ex.: "All men should be treated equally under the law."

8.3 Reassessment - The speaker re-evaluates a position or hypothesis in light of new evidence.

Ex.: "I think I changed my stand and agree with John. Socialism isn't always bad."

9. Grounding: The speaker gives reasons supporting a position or hypothesis. Grounding statements must be clearly linked to a position-statement, hypothesis, or proposed definition.

9.1 General Knowledge - The speaker defends a position by citing general knowledge without referring to the source of the knowledge.

Ex.: (so why shouldn't they vote!)* "18-year olds can be drafted,"...

9.2 Authority - The speaker defends a statement or position by citing an expert or source.

Ex.: (I'm against the riots and I think they should be stopped)* "I was reading a Time article, and it seems that tear gas works pretty good."

9.3 Personal Experience - The speaker defends a position by citing personal experience.

Ex.: (I don't think that Negroes are discriminated against)* ..."Up at the shop where I work, some of the colored have better rates on their machines than the whites do."

9.4 Experience of Others - The speaker defends a position by citing experience of others.

Ex.: (I think that the publicity given LSD has encouraged kids to take it)*... "This girl was saying that the reason she took LSD was because they gave such a write-up in the papers about what it does for you."

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* This is the position which is being grounded by the example.

9.5 Consequences - The speaker defends a statement or position by pointing to its logical or pragmatic consequences.

Ex.: (I don't think we should use nuclear bombs on North Vietnam)* ..."If we use nuclear bombs on North Vietnam, Russia would probably be forced to enter the war."

9.6 Position-taking - The speaker defends a position by reference to another position.

Ex.: ("I think the riots at Columbia were necessary)* ...because the president of Columbia was incompetent."

9.7 No Public Grounds - The speaker explicitly or implicitly refuses to defend a position which he has put forth.

Ex.: (I think we should stop the war in Vietnam)* ..."I just think we should."

GUIDELINES

1. When categorizing, paraphrase the content of the unit and categorize in reference to the context of the discourse and intent of the speaker.
2. In case of doubt regarding the number of units in a discourse, carefully examine the context and overall intent of the speaker. Subdivide only when there is a clear switch in units or speakers.
3. In case of strong doubts regarding statements which could be categorized into two different categories, use the following preference scheme:
    a. Definition
    b. Grounding
    c. Position-Hypothesis
    d. Exposition
    e. Clarification
    f. Non-Cognitive

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* This is the position which is being grounded by the example.

4. To be categorized under position and hypothesis, the statement must be the speaker's own hypothesis or position.

5. Background information frequently accompanies a request for a position. If it is impossible to understand the request without including the background information, then code the discourse as one unit--i.e., request for a position. If this request can be understood without the background information, then code the discourse as two units--i.e., background and request for a position.

Exs.:

T3 T: President Nixon would like the surtax
extended. Do you agree with his position?

T: The United States has consistently voted
T61 against seating Red China in the United
Nations. Many writers have argued lately
that we should change our policy./ What
T3 do you think? Do you think China should
be included in the U.N.?/

6. Positions taken on the definition of word(s) should be coded under definition; applications of definitions should be coded under positions or hypotheses.

Exs.:

S: I think a total war is a war in which the
S71 entire resources of the country are used
to win the war.

S81 S: I think World War I was a total war.

7. If grounding statements are not clearly linked to positions, hypotheses, or definitions, categorize them under exposition.

8. When the following sequence occurs: position, another code (e.g., grounding), position, code as follows:

81/91/81 if the second position is different from the first

81/91/52 if the second position is the same as the first

Exs.:

S: I think the Senate is going to pass the
S81 ABM proposal./ The latest Gallop Poll
S92 shows that 51 Senators favor the pro-
S52 posal and 49 are opposed./ It will pass./

S81 S: The Senate will pass the ABM proposal./
The latest Gallop Poll shows that 51
S92 Senators favor the proposal and 49 are
S82 opposed./ It is a mistake, though, the
Senate should not pass the bill.

9. Background (6.1) emphasizes content. Maintenance (5.1) stresses classroom procedure.

10. When the speaker is providing new information, do not categorize the statements as summarizing.

11. Categorize rhetorical questions (i.e., the speaker does not expect a response) as performing.

12. If a speaker asks a question that includes a request for confirmation of background information, a position, clarification, a definition, or grounding, code the question as a literal request. If the response is merely a confirmation, code it as encouragement, "53."

Exs.:	T3	T:	Don't you think that protecting the health of the mother is a sufficient reason for an abortion?
	S53	S:	Yes.
	S3	S:	Don't you think that protecting the health of the mother is a sufficient reason for an abortion?
	S82	S:	The life of the child should be the most important consideration.

13. Beware of the clarification (7.3) category. It is often confused with position-taking, grounding, background, definition, etc. It should be used as little as possible.

14. If in the middle of a cognitive unit, the speaker calls on another individual, code the main cognitive unit only once and code "the calling on the other individual" as a separate unit at the end of the main cognitive unit.

15. If in the middle of a cognitive unit the speaker interrupts himself to perform classroom maintenance operations other than just calling on another individual, (1) code the operation occurring before the interruption, (2) code the interruption, and (3) code the operation occurring after the interruption.

16. If a cognitive unit is interrupted by another speaker and then completed, code cognitive unit only once.

17. Partial comments, interrupted thoughts or classroom confusion caused by many people talking should be categorized as "Fragmented Discussion," (5.6).

18. If discourse is fragmented but it is clear from the context which cognitive unit occurred, *do not* code the

discourse as fragmented; instead, code the discourse in the appropriate cognitive category. The coders should be reasonably certain from the context that the code is correct.

19. Do not code classroom laughter as a separate cognitive unit.

APPENDIX C

MINNESOTA STUDENT ATTITUDE INVENTORY

MINNESOTA STUDENT ATTITUDE INVENTORY

This is not a test because there are no wrong answers. The answer to each question is A MATTER OF OPINION, and your true opinion, whatever it is, IS THE RIGHT ANSWER. You will be asked a lot of questions about how much you like this class, the teacher, and the work you are doing here. All the questions refer to THIS ONE CLASS AND THIS PARTICULAR TEACHER. By giving frank, true answers to show exactly how you feel, you can help us understand the opinions of students.

DIRECTIONS:

1. Please do not write your name on the answer sheet.
2. Do not skip any questions--answer each one carefully.
3. Make sure that the number on the answer sheet matches the question number when you mark your answer. Double check when you are asked.

HERE IS AN EXAMPLE

O. I think my homework is very hard.
SD--Strongly Disagree D--Disagree U--Uncertain
A--Agree SA--Strongly Agree

You have five alternatives to choose from. You might Strongly Disagree with the statement. If so, you would put an "X" in the SD box on your answer sheet, like this:

	SD	D	U	A	SA
O.	☒	☐	☐	☐	☐
	e	m	l	b	j

If you felt UNCERTAIN about the statement, you would put an "X" in the U box on your answer sheet, like this:

	SD	D	U	A	SA
O.	☐	☐	☒	☐	☐
	a	b	l	d	j

Or, for example, you might AGREE with the statement, but not STRONGLY. If so, you would put an "X" in the A box, like this:

	SD	D	U	A	SA
O.	☐	☐	☐	☒	☐
	a	m	c	b	j

Pay no attention to the little letters under the boxes on your answer sheet.

And, DO NOT WRITE ON THIS QUESTIONNAIRE BECAUSE OTHER STUDENTS WILL HAVE TO USE IT.

1. This teacher asks our opinion in planning work to be done.

   SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
   A--AGREE SA--STRONGLY AGREE

2. This teacher keeps order with a fair and firm hand.

   SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
   A--AGREE SA--STRONGLY AGREE

3. I get along well with this teacher.

   SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
   A--AGREE SA--STRONGLY AGREE

4. I find it easy to talk to this teacher.

   SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
   A--AGREE SA--STRONGLY AGREE

5. This teacher never asks trick questions to show how dumb we are.

   SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
   A--AGREE SA--STRONGLY AGREE

6. Most of us get pretty bored in this class.

   SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
   A--AGREE SA--STRONGLY AGREE

7. This teacher never slaps us or handles us roughly.

   SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
   A--AGREE SA--STRONGLY AGREE

8. No one dares talk back to this teacher.

   SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
   A--AGREE SA--STRONGLY AGREE

9. This teacher is one of the best I have ever had.

   SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
   A--AGREE SA--STRONGLY AGREE

10. I just don't trust this teacher.

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

11. It is easy to fool this teacher.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

12. This teacher makes sure WE understand our work.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

13. This teacher often sends boys and girls out of the room as punishment.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

14. This teacher really understands boys and girls my age.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

15. Our teacher is very good at explaining things clearly.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

16. Frankly, we don't pay attention to this teacher.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

17. This teacher has lost the respect of the class.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

18. Sometimes things "get out of control" in this class.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

19. This teacher certainly knows what he(she) is doing.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

20. This teacher often "bawls you out" in front of the class.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

21. This teacher makes it fun to study things.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

22. This teacher has some special favorites or "teacher's pets."

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

23. Our teacher never gives us extra assignments as punishment.

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

24. This teacher wants to check our work to make sure we are on the right track.

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

25. I really like this class.

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

26. Sometimes I think this teacher is deaf.

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

27. This teacher helps us get the most out of each hour.

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

28. This teacher is cool and calm.

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

29. In this class we fool around a lot in spite of the teacher.

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

30. When I'm in trouble I can count on this teacher to help.

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

31. This teacher becomes confused easily.

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

32. This teacher will punish the whole class when he(she) can't find out who did something bad.

    SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
    A--AGREE SA--STRONGLY AGREE

33. This teacher thinks clearly.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

34. Some of the students are smarter than this teacher.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

35. This teacher lets us discuss things in class.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

36. It is fun to see how much we can whisper before we get caught.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

37. This teacher makes everything seem interesting and important.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

38. I wish I could get even with this teacher.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

39. This teacher knows a lot.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

40. This teacher is quick to see a new point.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

41. This teacher is too bossy.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

42. This teacher never gets angry and shouts at us.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

43. We often complain just to get out of work.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

44. If I could get away with it, I'd sure like to tell this teacher off!

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

45. This class is noisy and fools around a lot.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

46. This is the best teacher I have ever had.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

47. You can't walk around in this class without permission.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

48. It seems that somebody is always getting punished in this class.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

49. I wish I could have this teacher next year.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

50. This teacher has lots of fun with us.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

51. Sometimes just thinking about this class makes me sick.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

52. This teacher makes very careful plans for each day's work.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

53. This teacher helps students when they have problems with their work.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

54. Frankly, we just don't obey the teacher in this class.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

55. This teacher always takes time to find out your side of a difficulty.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

56. This teacher never pushes us or shakes us in anger.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

57. This teacher punishes me for things I don't do.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

58. This teacher likes to hear students' ideas.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

59. We behave well in this class even when the teacher is out of the room.

SD--STRONGLY DISAGREE D--DISAGREE U--UNDECIDED
A--AGREE SA--STRONGLY AGREE

APPENDIX D

HARVARD SOCIAL ISSUES ANALYSIS TEST #2

FORM I - II

HARVARD SOCIAL ISSUES ANALYSIS TEST #2

Inquiry into Social Issues
The University of Michigan
611 Church Street
Ann Arbor, Michigan 48104

Directions

This booklet contains several different types of tests which are designed to find out how well you are able to think about social issues.

DO NOT TURN THIS PAGE UNTIL INSTRUCTED TO DO SO.

Do not make any marks on this test booklet. All answers are to be made on the separate answer sheet provided. If you wish to change an answer be sure to erase your old answer completely.

I - II

Read the following conversation carefully. You will be asked several questions based on what you read. While answering the questions you may look back as often as necessary.

BEN AND ROB DISCUSS SCHOOLS IN THE SOUTH

Ben: The Supreme Court of the United States has said that Negroes have the right to go to school with whites, and those prejudiced Southerners are still trying to keep Negroes and whites in separate schools. This is a bad situation. People are being denied their rights, men are losing respect for the law, and worst of all, in many places, Negroes are too scared to stand up and demand what belongs to them.

Rob: You may say the Negroes are being denied their rights, but I say all the Southern States are being denied their rights. After all, who gave the Supreme Court the power to run the country's schools? Everyone knows that the states have the power to run their schools. The Federal Government ought to keep its hands off education.

Ben: That's easy enough for you to say. You're free, white and 21. But suppose you were some poor bug crawling in the dirt and whenever someone felt like it, he could crush you with his foot? How would you feel then? Pretty helpless--and that's how the Negro feels.

Rob: If you think the Negro is a bug, that's your business. All I know is that people in the South had its problems well under control when those Northerners on the Supreme Court came along with their half-baked ideas on equal rights.

Ben: What's so half-baked about equal rights? You might as well call the United States Constitution half-baked. What you are saying is that equal rights can mean one thing for the states, and another thing for the Supreme Court.

Rob: Now really, just because the Negro is treated differently doesn't mean he's not getting equal rights. The writers of the Constitution said nothing about forcing whites and Negroes to go to the same schools. They left that issue up to the states.

Ben: You mean to say that sending Negroes to school in broken-down shacks without running water is giving them equal rights and a fair chance? Common decency tells us that the kind of treatment the Negro is getting is bad. It doesn't have to be spelled out in black and white in the Constitution.

Rob: Obviously you and I have a different idea about what common decency is. The Negro is lucky if he gets any education at all. The people in each state have the right to decide what treatment the Negroes will get. After all, the people in the Southern States are closest to the problem; why not let them decide?

Ben: A criminal's friends are closest to him, but should we let them judge whether or not he has committeed a crime?

Rob: You really have me baffled. I don't see what judging criminals has to do with whites and Negroes going to separate schools.

Part A. Argument Summary.

On your answer sheet check the question which best describes what the argument is about.

1.
a. Who should determine what equal rights for all means in public education?
b. Is it important to determine what equal rights for all means in public education?
c. What are the major problems in teaching Negroes and whites in Southern Schools?
d. Should the Supreme Court or the writers of the Constitution have the final say about the meaning of equal rights?
e. Do Negroes deserve to get as good an education as whites?

Part B. Ideas of Right and Wrong.

Ben and Rob disagree about some important ideas of right and wrong. On your answer sheet check the statement below which best describes their disagreement over what is right and wrong.

2. a. Is it better to lose some of your rights by making whites go to school with Negroes or let the Federal Government step in and guarantee equal rights for all?

   b. Should we let people at home work out their own problems even though some do not get full rights; or should we allow the Federal Government to step in and guarantee equal rights for all?

   c. Is it better for the Federal Government to improve the schools than to sit by and see the Supreme Court take away the rights of Southern States?

   d. Should we let the people at home work out their own problems even though some do not get a fair chance, or should we see that the states are guaranteed their Constitutional rights?

   e. Is it better to have peace and order in America's schools than to risk violence by having the Federal Government interfere in the name of equal rights?

Part C. Who Said What?

Items 3 through 7 describe in different words something Ben said in the argument, something Rob said in the argument, or something that neither or both might have said in the argument. On your answer sheet check B if you think Ben made the statement; check R if you think Rob made the statement. If you think neither or both might have made the statement, check Can't tell.

3. In the South, the Negroes are not getting the rights they deserve.

4. The Supreme Court has taken too much power away from the President and Congress.

5. We should be more sympathetic toward the position of the Negro in the South.

6. The Negroes in the South are afraid to claim those rights guaranteed to them in the Constitution.

7. What goes on in a public school is the business of the state government.

Part D. Supporting Statements.

Items 8 through 12 are statements of fact which you can assume are true. If these statements had been made at any time during the argument, do you think they would have supported Ben's position, Rob's position, or the position of neither or both? On your answer sheet check B if you think the statement supports Ben's position; check R if you think the statement supports Rob's position. If you think the statement supports neither or both positions, check Can't tell.

8. Between 1882 and 1955, 3,440 Negroes were lynched in the United States.

9. Southern states spend less money on public education than do the states in the North.

10. Roadell, an expert on American government, stated that the Supreme Court has the power to decide what rights belong to the American people under the Constitution.

11. De Toqueville, a noted student of American government, stated that local government is very important to American democracy.

12. Negro students are now allowed in many formerly all-white schools in the South.

Part E. Argument Reply.

Items 13 through 17 contain statements made by Ben or Rob in the argument. In this part of the test you are to check the two best replies which you might have made to each statement if you had been in the argument. The best replies are those which may clarify the disagreement or move the argument forward toward some agreement. Remember, for items 13 through 17, check the two best ways to answer each statement.

13. Everyone knows that the states have the power to run their schools. The Federal Government ought to keep its hands off education.

a. Shouldn't the Federal Government have something to say about the way Negroes are treated in the public schools?

b. The schools don't belong to the states; they belong to the nation; they belong to all the people.

c. Just who do you mean by everyone?

d. Just which states are you talking about?

e. On what basis do you make the claim that the Federal Government is forbidden to have some say in public education?

14. What you are saying is that equal rights has two meanings: one for the states, and one for the Supreme Court.

a. Let's clear up what we mean by equal rights before we go any further.

b. Equal rights has only one meaning; the one found in the Constitution.

c. The American Constitution makes it very clear what equal rights means.

d. Saying that equal rights has two meanings is not reasonable or logical.

e. Then we are arguing over whether equal rights includes mixing the races in the schools.

15. All I know is that the people in the South had its race problems well under control when those Northerners on the Supreme Court came along with their half-baked ideas on equal rights.

a. Would you spell out what you're getting at when you say "well under control?"

b. Where did you get the idea that their race problems were all under control?

c. The Southerners certainly did not have their race problems under control.

d. The Supreme Court gave the Negro his rights because the Southerners did not have their race problems under control.

e. Don't you think that the real point is what goes on in the schools and not what the Supreme Court thinks about equal rights?

16. Common decency tells us that the kind of treatment the Negroes are getting is bad.

a. What common decency means is just a matter of personal opinion.

b. What is your idea of common decency anyway!

c. Show me where the Constitution uses the words common decency.

d. Let's see if we can get an accurate description of the way Negroes are commonly treated in the South.

e. Let's stick to the point and discuss whether the races should be separated in the schools.

17. Suppose you were some poor bug crawling in the dirt and whenever someone felt like it, he could crush you with his foot. How would you feel then? Pretty helpless-and that's how the Negro feels.

a. Saying Negroes are like bugs is not a fair comparison.

b. There are many whites who are as bad off as the Negroes. Would you compare them to bugs?

c. The Negroes are not like bugs; they have good lawyers and have fought this issue through the courts.

d. Whether or not Negroes are like bugs has nothing to do with the argument.

e. How do you know that Negroes are so helpless?

APPENDIX E

RECORDING THE CLASSROOM INTERACTION

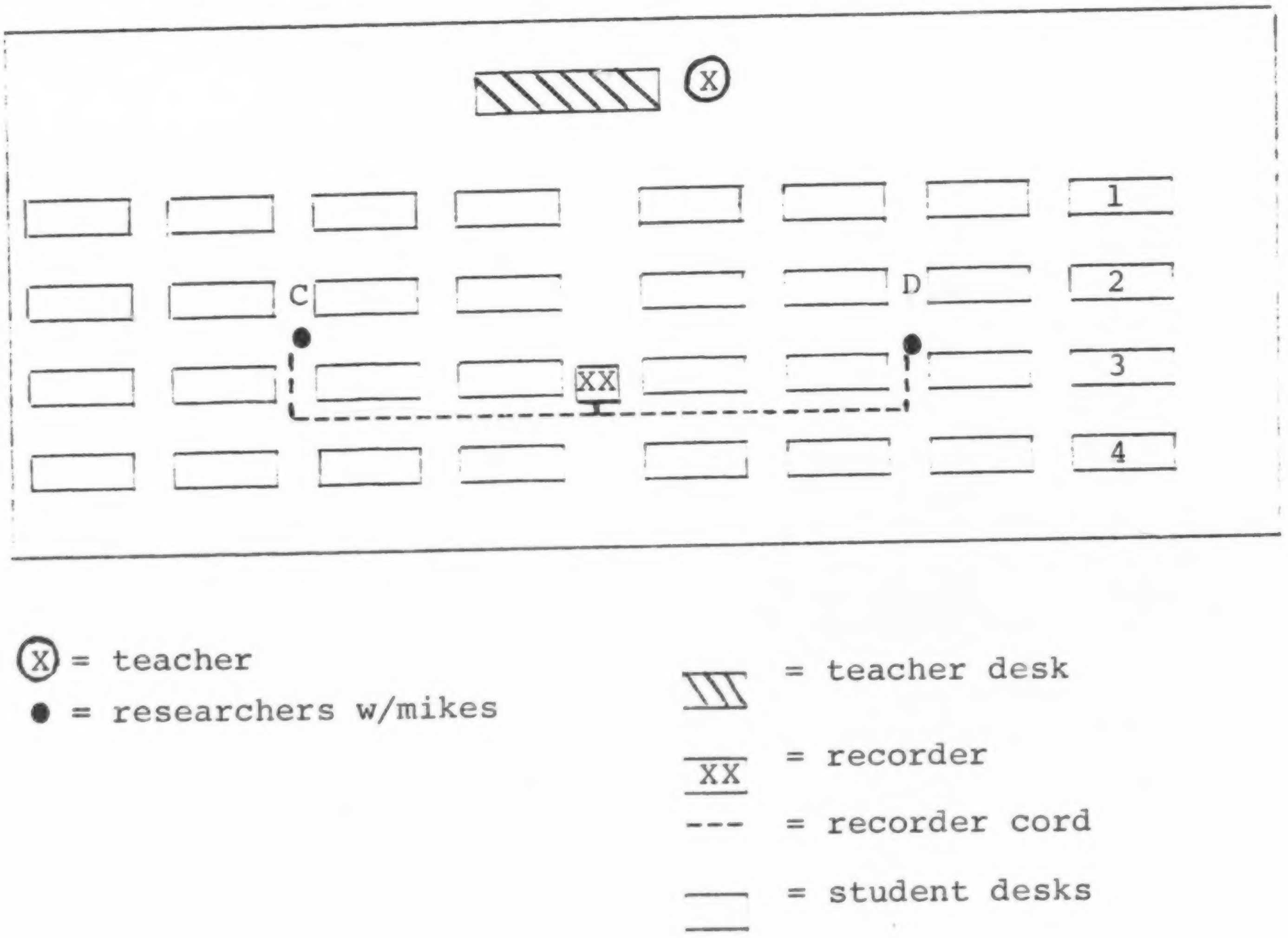
Alternate placements of the recording equipment and different types of microphones were tried during training sessions held at the University of Michigan Laboratory School. Based on the quality of the tapes recorded during this testing phase, the research team decided to use sensitive omni directional microphones carried by two researchers who pointed the microphone in the direction of the person speaking.

The research recording team also experimented with stationary microphones, but it was impossible to record all of the verbal interaction. Another option tried was a traveling microphone attached around the teacher's neck and stationary microphones placed around the room. Although this arrangement facilitated picking up the teacher's voice, it had several disadvantages: (1) teachers were not accustomed to teaching with a microphone hanging around their neck and most teachers found this recording technique awkward, (2) the use of four microphones required a microphone jack, and, consequently, diminished the power available to each individual microphone, and (3) the same problem still existed regarding the stationary use of microphones (i.e., it was impossible to record students who were not sitting close to the microphones). The possibility of using a boom or rifle microphone was also considered. This technique was discarded because the researchers decided the psychological disadvantage which results from pointing a long rifle microphone at a speaker would outweigh the advantages.

(1) Placement of Recording Equipment

In the classrooms taped for the study, the classroom organization encountered most frequently approximated the pattern in diagram A. As shown in the diagram, the teacher's desk was

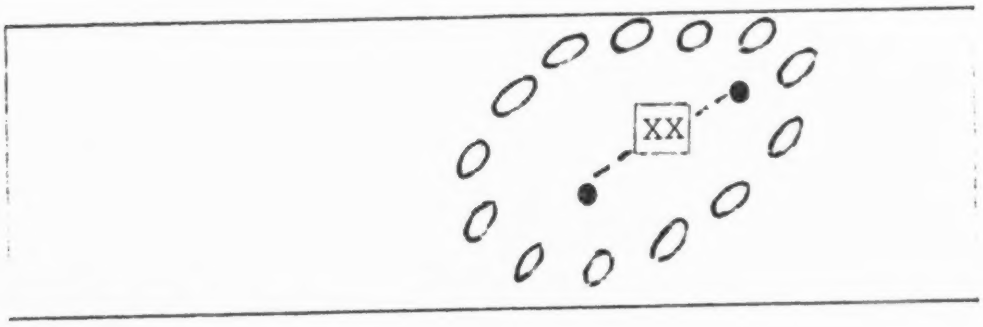
PATTERN A



located at the front of the room and the student desks were placed in rows. The recorder was placed in the center of the room toward the back, preferably with an equal number of rows of desks on each side of the recorder. The two researchers walked between rows, and each was responsible for picking up the dialogue in two rows. Both researchers covered the teacher by moving toward the front of the room when the teacher was speaking. The researchers carried the microphone in their hands and pointed the microphone in the direction of the person speaking. For example, in diagram A, if the teacher is speaking both researchers C and D moved toward the front of the classroom with the microphone aimed toward the teacher. If student "3" started to speak, researcher D moved back within at least three feet of the student and aimed the microphone toward him. Researcher C stayed toward the front of the room in his row, but aimed the microphone in the direction of student "3" while he was speaking. This recording technique minimized the amount of moving necessary to record the dialogue, left the teacher free to move around the classroom in his normal fashion, and produced an excellent tape.

Some of the classes were arranged in a circle and the teacher sat with the students in the circle. This classroom arrangement certainly has advantages for the teacher trying to involve the students in a discussion process, but presents certain problems for recording. The decision was made to place the recorder in the center of the room on the floor with the two researchers standing in the middle of the circle. This arrangement certainly was not ideal, but attempts to place the equipment and researchers outside the circle and record the dialogue were unsuccessful. The researchers could not pick up all the dialogue because they did not have enough time between student and teacher statements to move around the outside of the circle. Although we were concerned that the presence of researchers in the middle of the circle would distract the students and teacher, we found that this was not the case; teachers and students quickly become acclimated to the presence of the researchers within a circle. The tapes recorded in this manner picked up almost all of the class verbal interaction.

PATTERN B



X = teacher

O = students

● = researchers w/mikes

XX = recorder

---- = microphone cord

Modifications were made in the placement of the recording equipment where necessary to fit the classroom seating arrangement. The general rules followed include: (1) place the recorder so that the maximum amount of cord is available for the researcher's use to pick up everyone's verbal contribution, (2) place the recorder so that the cords do not restrict the movement of the teacher, (3) if possible, place the recorder in a central position so that the researchers have approximately the same amount of room space and number of students to cover.

APPENDIX F

MATRICES AND CALCULATION OF INTERACTION VARIABLES FOR CLASS H

A. THE MATRICES

The following three matrices illustrate the different ways interaction data for a class were summarized for this study.

Matrix One shows the distribution and relationship among all the intellectual operations which occurred in class H's discussion of the draft. The sequence of interaction codes for this class are tallied in the matrix, one pair at a time; the duration of each operation is not taken into account. The cell in which a particular pair is tabulated is determined by using the first operation in the pair to indicate the row and the second operation in the pair to indicate the column. For example, this series of interaction codes-- T3,T5,S8,T5, S8,S2-- would be entered in the matrix as follows: The first pair of codes is T3-T5 and is tallied in the cell formed by the matrix row T3 and the column T5. The second pair is T5-S8 and is entered into the cell formed by row T5, column S8. The third pair, S8-T5, the fourth pair, T5-S8, and the fifth pair, S8-S2 are tallied in a similar fashion. Each pair of operations overlaps with the previous pair, and each operation, except the first and last, is used twice. The Total column to the right of the matrix shows the number of times a particular operation was the first operation in a pair while the Total row at the bottom of the matrix shows the number of times a particular operation was the second operation in a pair. In class H there were 412 separate intellectual operations. The teacher performed 94 noncognitive operations, T8, and requested 43 hypotheses, T3. The students gave 82 hypotheses, S8, and provided 48 separate grounding operations, S9. Let's see what happened after the teacher requested a hypothesis. Looking at the T3 row we discover that seven times the teacher followed his request with a noncognitive operation, T5 -- probably he called on a student, once he offered a hypothesis, T8, once a student requested a hypothesis, S3, but the majority of the time, 27 times, the students provided hypotheses, S8.

Matrix Two shows how the class time was distributed among the intellectual operations. In this matrix the duration of each intellectual operation is taken into account and the interaction codes are tallied at one-second intervals. The total column in this matrix shows the amount of time in seconds devoted to a particular operation. In class H students spent 318 seconds providing exposition, S6, 376 seconds offering hypotheses, S8, and 411 seconds grounding or evidencing, S9. The diagonal cells in the matrix (eg. (T3,T3)) are steady state cells; they represent the duration of time spent performing a given operation. The other cells are transitional cells; the number of operations in these cells is identical to the number of operations in the corresponding cells in matrix one.

Matrix Three shows the distribution and relationship among the cognitive operations which occured in class H. All of the noncognitive categories, T5 and S5, were ignored when this matrix was tabulated. This matrix is helpful if one is interested in

MATRIX ONE

INTELLECTUAL OPERATIONS FOR 18 MAIN CATEGORIES
DISCUSSION OF THE DRAFT BY CLASS H

CATEGORY		TEACHER									STUDENT									TOTALS
		REQUESTS				NC	PERFORMS				REQUESTS				NC	PERFORMS				
		T1	T2	T3	T4	T5	T6	T7	T8	T9	S1	S2	S3	S4	S5	S6	S7	S8	S9	
TEACHER Requests ↓ Noncog. Performs ↓	T1					1									2	5				8
	T2														6		6			12
	T3					7			1				1		5		1	27	1	43
	T4													1	4			1	6	12
	T5	4	1	6	2	22	4	3	2		5	2			3	5	2	28	5	94
	T6			2		7					1	2			1	1		1	1	16
	T7		1	2		1									4			1		9
	T8		1		1	2	1			1		1						2		9
	T9			1																1
STUDENT Requests ↓ Noncog. Performs ↓	S1			1		1	4	1												7
	S2					3		1	1						1			1		7
	S3			2		1			1											4
	S4					1			1											2
	S5	2	3	3	2	9	2	2			1		1	1	3			4	1	34
	S6	2		2	1	5									1	3				14
	S7			2		6		1											1	10
	S8		3	11	3	18	3		3				2					8	31	82
	S9		3	11	3	10	2	1				2			4		1	9	2	48
TOTALS		8	12	43	12	94	16	9	9	1	7	7	4	2	34	14	10	82	48	412

MATRIX TWO

TIMED MATRIX FOR 18 MAIN CATEGORIES
DISCUSSION OF THE DRAFT BY CLASS H

CATEGORY		TEACHER									STUDENT									TOTAL NO. OF SECONDS
		REQUESTS				NC	PERFORMS				REQUESTS				NC	PERFORMS				
		T1	T2	T3	T4	T5	T6	T7	T8	T9	S1	S2	S3	S4	S5	S6	S7	S8	S9	
TEACHER Requests	T1	17				1									2	5				25
↓	T2		32												6		6			44
	T3			180		7			1				1		5		1	27	1	223
	T4				28									1	4			1	6	40
Noncog. Performs	T5	4	1	6	2	102	3	3	2		5	2			3	5	2	28	5	173
↓	T6			2		7	97				1	2			1	1		1	1	113
	T7		1	2		1		51							4			1		60
	T8		1		1	2	1		41	1		1						2		50
	T9			1						11										12
STUDENT Requests	S1			1		1	4	1			65									72
↓	S2					3		1	1			25			1			1		32
	S3			2		1			1				9							13
	S4					1			1					3						5
Noncog. Performs	S5	2	3	3	2	9	2	2			1		1	1	70			4	1	101
↓	S6	2		2	1	5									1	307				318
	S7			2		6		1									51		1	61
	S8		3	11	3	18	3		3				2					302	31	376
	S9		3	11	3	10	2	1				2			4		1	9	365	411
TOTAL NO. OF SECONDS		25	44	223	40	174	112	60	50	12	72	32	13	5	101	318	61	376	411	2129

MATRIX THREE

INTELLECTUAL OPERATIONS FOR 16 MAIN COGNITIVE CATEGORIES
DISCUSSION OF THE DRAFT BY CLASS H

CATEGORY		TEACHER								STUDENT								TOTALS
		REQUESTS			PERFORMS					REQUESTS				PERFORMS				
		T1	T2	T3	T4	T6	T7	T8	T9	S1	S2	S3	S4	S6	S7	S8	S9	
TEACHER Requests	T1	1												6			1	8
↓	T2		3				1							1	6	1		12
	T3			1		1		1			1	1	1		1	34	2	43
	T4			1	2								1			2	6	12
Performs	T6			2	1	2				2	2		1	2		3	1	16
↓	T7		1	2						1		1				4		9
	T8		1		1	1			1		1					4		9
	T9			1														1
STUDENT Requests	S1			1		4	1							1				7
↓	S2		1	1			3	1								1		7
	S3			2				1							1			4
	S4							1									1	2
Performs	S6	4		2	1	2		1						4				14
↓	S7			4			3								1	1	1	10
	S8	1	3	14	4	4		3		2		2				18	31	82
	S9	2	3	12	3	2	1	1		1	3				1	14	5	48
TOTALS		8	12	43	12	16	9	9	1	6	7	4	3	14	10	82	48	284

answering questions such as: what cognitive operations followed the teacher's request for a hypothesis? Frequently the presence of the noncognitive categories masks the flow of cognitive operations. For example, in matrix one we saw that 7 times the teacher followed a T3 request with a noncognitive operation, T5; if the teacher was simply recognizing a student, did the student then provide the requested hypothesis? By ignoring the noncognitive operations and looking at the T3 row in matrix three, we can find our answer. Thirty-four times (out of a possible 43) the students responded with hypotheses. This is 7 more times than was apparent in matrix one. Evidently then, those 7 teacher noncognitive operations were followed by the students providing hypotheses.

B. CALCULATION OF INTERACTION VARIABLES FOR CLASS H

In this study six variables were calculated from class interaction data. One variable was computed from the distribution of intellectual operations (Matrix One), four variables were based on the distribution of class time among categories (Matrix Two), and one variable was based upon the interrelation of cognitive operations (Matrix Three).

Intellectual Operations

$$\text{Teacher Requests for Inquiry} = \frac{T2 + T3 + T4}{\text{Teacher Categories}} \text{ (operations)}$$

$$= \frac{12+43+12}{8+12+43+12+94+16+9+9+1} = .33$$

Time

$$\underline{i/e} = \frac{T7+T8+T9+S7+S8+S9}{T6+S6}$$

$$= \frac{60+50+12+61+376+411}{113+318} = 2.25$$

$$\underline{p/i} = \frac{T7+T9+S7+S9}{T7+T8+T9+S7+S8+S9}$$

$$= \frac{60+12+61+411}{60+50+12+61+376+411} = .56$$

$$\underline{\text{Student}}\ \underline{\text{Participation}} = \frac{\text{Student Categories}}{\text{Total Class Time}}$$

$$= \frac{72+32+13+5+101+318+61+376+411}{2129} = .64$$

$$\underline{\text{Indirect}}\ \underline{\text{Teacher}}\ \underline{\text{Influence}} = \frac{T1+T2+T3+T4+T50+T52+T53}{T51+T54+T55+T6+T7+T8+T9}$$

$$= \frac{25+55+223+40+0+42+40}{63+10+9+113+60+50+12} = 1.33$$

COGNITIVE OPERATIONS

$$\underline{\text{Probes Following Student Hypotheses}} =$$

$$\frac{(S8,T2)+(S8,T4)+(S8,T7)+(S8,T9)+(S8,S2)+(S8,S4)+(S8,S7)+(S8,S9)}{S8} =$$

$$\frac{3+4+0+0+0+0+0+31}{82} = .46$$

APPENDIX G

SUMMARY OF CLASSROOM INTERACTION DATA FOR EACH CLASS USING MICHIGAN SOCIAL ISSUES COGNITIVE CATEGORY SYSTEM

NUMBER OF INTELLECTUAL OPERATIONS IN EACH OF THE 52 CATEGORIES

PERCENT DISTRIBUTION OF INTELLECTUAL OPERATIONS IN 52 CATEGORIES

AMOUNT OF TIME SPENT IN EACH OF THE 52 CATEGORIES

PERCENT DISTRIBUTION OF TIME SPENT IN 52 CATEGORIES

NUMBER OF INTELLECTUAL OPERATIONS IN EACH
OF THE 52 CATEGORIES

Class	CATEGORY													
	T10	T20	T30	T40	T50	T51	T52	T53	T54	T55	T56	T61	T62	T71
A	39	15	49	5	1	42	18	22	1	30	8	12	0	1
B	2	12	38	8	4	48	7	15	0	2	26	7	4	0
C	33	7	36	4	5	49	49	21	1	6	1	43	0	3
D	3	10	43	4	7	50	22	41	0	2	1	10	2	3
E	11	4	4	0	0	39	3	29	0	0	0	8	0	1
F	60	6	3	0	3	30	17	25	0	7	0	26	0	1
G	6	0	25	0	5	27	1	11	0	1	1	5	2	0
H	8	12	43	12	0	42	9	31	2	4	6	13	3	0
I	2	8	25	1	4	42	7	16	1	2	0	6	5	0
J	14	0	13	3	1	47	6	27	0	0	0	9	3	0
K	1	5	36	4	0	39	5	15	0	0	0	8	1	0
L	1	16	42	6	18	52	24	34	0	2	1	3	3	0
M	0	2	17	4	12	37	13	30	2	5	2	24	1	5
N	1	14	33	0	3	53	13	25	0	0	3	1	6	2
O	15	2	33	3	1	34	12	17	0	2	0	15	1	3
P	45	17	53	12	10	33	28	37	0	8	0	3	7	1

(Cont. on next page)

NUMBER OF INTELLECTUAL OPERATIONS IN EACH OF THE 52 CATEGORIES

	CATEGORY													
Class	T72	T73	T81	T82	T83	T91	T92	T93	T94	T95	T96	T97	S10	S20
A	0	1	11	0	0	1	0	0	0	0	1	0	2	4
B	0	3	9	0	0	0	0	0	0	0	1	0	4	5
C	0	0	11	0	0	0	0	0	0	1	0	0	0	4
D	0	1	14	1	0	0	1	0	0	1	0	0	0	1
E	0	0	5	0	0	2	0	0	0	0	0	0	0	2
F	0	5	2	0	0	0	0	0	0	0	0	0	6	2
G	0	1	1	1	0	0	0	0	0	1	1	0	1	4
H	0	9	8	1	0	1	0	0	0	0	0	0	7	7
I	0	2	14	0	0	3	1	1	0	0	1	0	1	8
J	0	0	9	0	0	0	0	0	0	0	2	0	0	0
K	0	2	14	1	0	1	0	1	1	0	5	0	0	1
L	0	2	7	0	0	0	0	0	0	0	0	0	0	3
M	0	7	11	0	0	5	1	0	0	0	3	0	6	13
N	0	3	4	0	0	1	0	0	0	0	0	0	1	1
O	0	5	14	0	0	3	1	1	2	1	1	0	1	1
P	0	8	8	0	0	0	0	0	0	0	0	0	0	8

(Cont. on next page)

NUMBER OF INTELLECTUAL OPERATIONS IN EACH
OF THE 52 CATEGORIES

	CATEGORY													
Class	S30	S40	S50	S51	S52	S53	S54	S55	S56	S61	S62	S71	S72	S73
A	4	1	2	1	7	17	3	19	87	62	1	1	0	6
B	13	0	1	4	1	25	5	14	109	12	0	0	0	9
C	0	0	1	2	6	10	5	2	5	30	0	3	0	0
D	0	0	0	8	5	9	2	3	3	4	0	0	0	4
E	0	0	0	0	0	0	0	0	0	25	0	4	0	0
F	0	0	7	2	1	7	3	0	13	53	0	1	0	3
G	7	0	1	15	6	7	3	1	5	29	1	0	0	1
H	4	2	0	1	6	16	3	3	5	14	0	3	0	7
I	21	7	0	21	16	12	2	8	4	10	1	2	0	9
J	0	0	0	2	2	0	0	0	0	20	0	2	0	0
K	0	0	0	0	13	9	1	0	3	4	0	1	0	2
L	0	0	0	12	2	13	5	0	4	5	0	0	0	4
M	9	0	3	15	4	5	1	21	6	1	0	0	0	1
N	6	0	0	2	6	3	7	1	23	8	0	10	0	4
O	1	0	1	1	3	9	4	0	2	11	0	1	0	1
P	1	0	0	9	16	21	7	10	13	56	1	10	0	6

(Cont. on next page)

NUMBER OF INTELLECTUAL OPERATIONS IN EACH OF THE 52 CATEGORIES

	CATEGORY										
Class	S81	S82	S83	S91	S92	S93	S94	S95	S96	S97	Total Number of Operations
A	81	0	0	6	0	1	0	1	13	1	577
B	162	3	0	12	1	11	1	1	14	2	610
C	27	0	0	2	0	0	0	0	2	0	369
D	89	2	1	1	0	3	3	1	23	0	379
E	3	0	0	0	0	0	0	0	0	0	139
F	1	0	0	0	0	0	0	0	0	0	284
G	60	14	0	7	2	0	1	2	16	0	272
H	76	5	1	24	0	1	0	5	16	2	413
I	92	20	1	20	5	1	1	2	20	2	426
J	34	0	0	8	3	0	0	0	10	0	215
K	77	1	1	23	3	2	0	0	31	0	311
L	66	1	0	7	0	0	0	1	24	0	358
M	28	0	1	4	0	0	0	0	3	0	302
N	57	0	0	11	0	1	0	1	22	0	326
O	35	0	0	10	0	0	1	2	5	0	254
P	47	1	0	11	0	1	2	0	9	1	500

PERCENT DISTRIBUTION OF INTELLECTUAL OPERATIONS IN THE 52 CATEGORIES

	CATEGORY													
Class	T10	T20	T30	T40	T50	T51	T52	T53	T54	T55	T56	T61	T62	T71
A	6.7	2.5	8.4	0.8	0.2	7.2	3.3	3.7	0.2	5.3	1.6	2.3	0.0	0.2
B	0.4	2.0	6.2	1.4	0.8	7.9	1.3	2.7	0.0	0.4	4.4	1.2	0.7	0.0
C	8.6	2.0	9.9	1.0	1.4	13.7	13.3	5.5	0.3	1.4	0.3	11.7	0.0	1.1
D	0.8	2.7	11.4	1.1	1.9	12.8	5.9	11.2	0.0	0.6	0.3	2.9	0.6	0.9
E	7.1	3.5	2.1	0.0	0.0	26.5	2.1	21.6	0.0	0.0	0.0	6.5	0.0	0.7
F	21.3	2.2	1.2	0.0	1.2	10.9	6.0	8.9	0.0	2.6	0.0	9.0	0.0	0.4
G	2.2	0.0	10.2	0.0	2.0	9.6	0.4	4.0	0.0	0.4	0.4	2.0	0.7	0.0
H	1.9	2.8	10.0	2.5	0.0	10.0	2.1	7.2	0.4	0.8	1.2	2.7	0.6	0.0
I	0.4	1.8	5.9	0.2	0.9	9.4	1.6	3.9	0.2	0.5	0.0	1.3	0.8	0.0
J	6.6	0.0	6.1	1.5	0.5	21.8	2.8	12.7	0.0	0.0	0.0	4.2	0.9	0.0
K	0.3	1.5	11.2	1.2	0.0	12.6	1.6	5.0	0.0	0.0	0.0	2.4	0.3	0.0
L	0.3	4.7	12.0	1.7	5.2	14.0	6.7	9.6	0.0	0.6	0.3	1.2	0.9	0.0
M	0.0	0.6	5.6	1.3	3.6	11.8	4.5	9.8	0.6	1.8	0.7	7.9	0.3	1.6
N	0.3	4.5	10.0	0.0	0.6	15.7	3.9	7.5	0.0	0.0	0.9	0.3	1.8	0.6
O	6.0	0.8	13.2	1.2	0.4	12.7	4.8	6.7	0.0	0.8	0.0	6.0	0.4	1.2
P	9.0	3.4	10.6	2.4	2.0	6.6	5.6	7.4	0.0	1.6	0.0	0.6	1.4	0.2
AVG	4.5	2.2	8.4	1.0	1.3	12.7	4.1	8.0	0.1	1.1	0.6	3.9	0.6	0.4

PERCENT DISTRIBUTION OF INTELLECTUAL OPERATIONS IN THE 52 CATEGORIES

	CATEGORY													
Class	T72	T73	T81	T82	T83	T91	T92	T93	T94	T95	T96	T97	S10	S20
A	0.0	0.2	1.9	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.4	0.7
B	0.0	0.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.8	0.9
C	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	1.1
D	0.0	0.3	4.0	0.3	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.3
E	0.0	0.0	3.5	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4
F	0.0	1.8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.8
G	0.0	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.4	1.6
H	0.0	1.9	1.5	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	1.6	1.5
I	0.0	0.4	3.0	0.0	0.0	0.7	0.2	0.2	0.0	0.0	0.2	0.0	0.2	2.0
J	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
K	0.0	0.6	3.9	0.3	0.0	0.3	0.0	0.3	0.3	0.0	1.6	0.0	0.0	0.3
L	0.0	0.6	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9
M	0.0	2.3	3.6	0.0	0.0	1.7	0.3	0.0	0.0	0.0	1.0	0.0	1.7	4.6
N	0.0	0.9	1.2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3
O	0.0	2.0	5.6	0.0	0.0	1.2	0.4	0.4	0.8	0.4	0.4	0.0	0.4	0.4
P	0.0	1.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
AVG	0.0	0.9	2.6	0.1	0.0	0.4	0.1	0.1	0.1	0.1	0.3	0.0	0.5	1.2

PERCENT DISTRIBUTION OF INTELLECTUAL OPERATIONS IN THE 52 CATEGORIES

	CATEGORIES													
Class	S30	S40	S50	S51	S52	S53	S54	S55	S56	S61	S62	S71	S72	S73
A	0.7	0.2	0.4	0.2	1.3	3.0	0.5	3.4	15.1	10.4	0.2	0.2	0.0	1.1
B	2.3	0.0	0.2	0.9	2.9	4.4	1.0	2.5	18.1	2.1	0.0	0.0	0.0	1.6
C	0.0	0.0	0.3	0.5	1.7	2.8	1.3	0.6	1.4	7.9	0.0	0.5	0.0	0.0
D	0.0	0.0	0.0	2.2	1.4	2.4	0.6	0.8	0.9	0.8	0.0	0.0	0.0	1.1
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.3	0.0	2.9	0.0	0.0
F	0.0	0.0	2.5	0.8	0.4	2.7	1.1	0.0	4.7	18.9	0.0	0.4	0.0	1.1
G	1.9	0.0	0.4	5.7	2.3	2.8	1.1	0.4	1.9	10.7	0.4	0.0	0.0	0.4
H	0.9	0.4	0.0	0.2	1.3	4.0	0.6	0.6	1.0	3.2	0.0	0.7	0.0	1.5
I	4.4	1.6	0.0	4.8	3.6	2.5	0.4	1.7	0.9	2.2	0.2	0.5	0.0	2.0
J	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	9.3	0.0	1.0	0.0	0.0
K	0.0	0.0	0.0	0.0	4.1	2.8	0.3	0.0	0.9	1.2	0.0	0.3	0.0	0.6
L	0.0	0.0	0.0	3.4	0.6	3.7	1.4	0.0	1.2	1.5	0.0	0.0	0.0	0.1
M	2.9	0.0	1.0	4.9	1.3	1.6	0.3	6.9	1.9	0.3	0.0	0.0	0.0	0.3
N	1.8	0.0	0.0	0.6	1.8	0.9	2.1	0.3	7.0	2.4	0.0	3.0	0.0	1.2
O	0.4	0.0	0.4	0.4	1.2	3.6	1.6	0.0	0.8	4.3	0.0	0.4	0.0	0.4
P	0.2	0.0	0.0	1.8	3.2	4.2	1.4	2.0	2.4	11.2	0.2	2.0	0.0	1.2
AVG	1.0	0.1	0.3	1.7	1.7	2.6	0.9	1.2	3.6	6.5	0.1	0.7	0.0	0.8

PERCENT DISTRIBUTION OF INTELLECTUAL OPERATIONS IN THE 52 CATEGORIES

Class	CATEGORY												
	S81	S82	S83	S91	S92	S93	S94	S95	S96	S97	% Teacher Total	% Student Total	Number of Total Codes
A	14.2	0.0	0.0	1.0	0.0	0.2	0.0	0.2	2.3	0.2	44.9	55.9	577
B	27.1	0.4	0.0	1.9	0.2	1.9	0.2	0.2	2.3	0.4	31.8	72.3	610
C	7.4	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.6	0.0	73.5	26.7	369
D	23.8	0.6	0.3	0.6	0.0	0.8	0.8	0.3	6.1	0.0	58.3	43.8	379
E	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0	23.7	139
F	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.3	36.1	284
G	21.7	5.5	0.0	2.6	0.7	0.0	0.4	0.7	5.8	0.0	33.9	67.4	272
H	18.3	1.2	0.2	5.8	0.0	0.2	0.0	1.2	3.7	0.4	46.0	48.5	413
I	21.3	4.6	0.2	4.8	1.1	0.2	0.2	0.4	4.3	0.4	31.6	64.5	426
J	15.9	0.0	0.0	3.7	1.4	0.0	0.0	0.0	4.7	0.0	59.5	38.0	215
K	24.6	0.3	0.3	7.7	0.9	0.0	0.0	0.0	10.2	0.0	43.4	55.5	311
L	18.5	0.3	0.0	2.0	0.0	0.0	0.0	0.3	6.8	0.0	59.9	41.7	358
M	9.2	0.0	0.3	1.3	0.0	0.0	0.0	0.0	1.0	0.0	59.0	39.5	302
N	17.4	0.0	0.0	3.4	0.0	0.3	0.0	0.3	6.7	0.0	48.5	49.8	326
O	13.8	0.0	0.0	4.0	0.0	0.0	0.4	0.8	2.0	0.0	65.4	35.3	254
P	9.4	0.2	0.0	2.2	0.0	0.2	0.4	0.0	1.8	0.2	54.0	45.8	500
AVG	15.3	0.8	0.1	2.6	0.3	0.2	0.2	0.3	3.6	0.1	53.6	47.5	

AMOUNT OF TIME SPENT IN EACH OF THE 52 CATEGORIES

	CATEGORY													
Class	T10	T20	T30	T40	T50	T51	T52	T53	T54	T55	T56	T61	T62	T71
A	137	29	227	20	2	72	37	30	1	60	19	121	0	3
B	16	27	152	23	9	77	36	26	0	4	45	99	46	0
C	188	29	326	9	21	447	93	41	2	40	20	1198	0	14
D	12	15	221	4	22	140	48	69	0	16	1	371	7	16
E	97	14	29	0	0	133	9	32	0	0	0	460	0	7
F	570	26	14	0	8	204	85	47	0	9	0	423	0	3
G	28	0	263	0	16	91	2	32	0	1	2	36	9	0
H	25	44	223	40	0	63	42	40	10	9	9	86	27	0
I	14	37	212	7	11	85	39	22	5	6	0	91	116	0
J	125	0	227	5	3	194	7	27	0	0	0	419	53	0
K	1	13	241	7	0	101	13	49	0	0	0	125	7	0
L	4	62	274	14	123	364	130	121	0	28	1	56	49	0
M	0	3	104	12	34	129	32	77	11	13	2	1158	15	73
N	14	95	428	0	7	275	54	34	0	0	7	37	185	45
O	81	12	300	9	2	156	39	49	0	7	0	407	21	26
P	220	65	410	29	36	142	52	56	0	26	0	34	101	17

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AMOUNT OF TIME SPENT IN EACH OF THE 52 CATEGORIES

Class	CATEGORY													
	T72	T73	T81	T82	T83	T91	T92	T93	T94	T95	T96	T97	S10	S20
A	0	3	79	0	0	5	0	0	0	0	20	0	7	6
B	0	16	41	0	0	0	0	0	0	0	3	0	17	18
C	0	0	71	0	0	0	0	0	0	13	0	0	0	6
D	0	4	188	13	0	0	4	0	0	6	0	0	0	2
E	0	0	47	0	0	81	0	0	0	0	0	0	0	2
F	0	22	6	0	0	0	0	0	0	0	0	0	24	5
G	0	11	6	9	0	0	0	0	0	12	10	0	8	23
H	0	60	45	5	0	12	0	0	0	0	0	0	72	32
I	0	13	122	0	0	40	6	17	0	0	8	0	11	37
J	0	0	119	0	0	0	0	0	0	0	29	0	0	0
K	0	11	143	3	0	11	0	37	27	0	40	0	0	3
L	0	10	123	0	0	0	0	0	0	0	0	0	0	10
M	0	73	87	0	0	88	12	0	0	0	46	0	13	58
N	0	20	28	0	0	24	0	0	0	0	0	0	4	3
O	0	53	204	0	0	47	31	24	40	20	8	0	4	2
P	0	29	37	0	0	0	0	0	0	0	0	0	0	9

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AMOUNT OF TIME SPENT IN EACH OF THE 52 CATEGORIES

Class	S30	S40	S50	S51	S52	S53	S54	S55	S56	S61	S62	S71	S72	S73
	CATEGORY													
A	14	6	3	1	30	22	6	26	273	278	19	2	0	15
B	48	0	2	10	62	39	12	32	196	95	0	0	0	36
C	0	0	1	2	6	10	6	13	11	51	0	7	0	0
D	0	0	0	8	11	10	4	3	8	41	0	0	0	27
E	0	0	0	0	0	0	0	0	0	1509	0	153	0	0
F	0	0	13	2	1	7	3	0	39	112	0	8	0	17
G	68	0	2	24	28	9	4	7	57	447	13	0	0	21
H	13	5	0	1	49	23	7	3	18	318	0	17	0	44
I	107	23	0	30	102	12	4	19	10	249	7	7	0	104
J	0	0	0	2	12	0	0	0	0	542	0	6	0	0
K	0	0	0	0	53	18	1	0	18	44	0	2	0	14
L	0	0	0	18	9	18	8	0	23	30	0	0	0	14
M	65	0	3	29	8	5	1	31	29	1	0	0	0	1
N	29	0	0	4	22	6	79	2	204	75	0	108	0	22
O	9	0	4	2	5	9	6	0	2	104	0	27	0	8
P	4	0	0	10	18	23	27	20	48	153	19	22	0	25

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AMOUNT OF TIME SPENT IN EACH OF THE 52 CATEGORIES

Class	CATEGORY										Total Amount of Time	
	S81	S82	S83	S91	S92	S93	S94	S95	S96	S97	Seconds	Minutes
A	477	0	0	70	0	21	0	4	85	2	2,232	37.2
B	945	15	0	87	5	162	25	5	114	5	2,550	42.5
C	58	0	0	7	0	0	0	0	4	0	2,694	44.9
D	618	15	2	4	0	31	51	11	246	0	2,249	37.5
E	33	0	0	0	0	0	0	0	0	0	2,606	43.4
F	6	0	0	0	0	0	0	0	0	0	1,654	27.6
G	543	82	0	68	19	0	7	17	148	0	2,123	35.4
H	360	7	9	244	0	4	0	43	115	5	2,129	35.5
I	705	179	5	211	78	15	24	19	120	5	2,931	48.9
J	326	0	0	99	6	0	0	0	151	0	2,352	39.2
K	536	2	2	203	53	15	0	0	314	0	2,107	35.1
L	217	3	0	78	0	0	0	5	244	0	2,036	33.9
M	128	0	4	13	0	0	0	0	14	0	2,372	39.5
N	805	0	0	135	0	32	0	13	441	0	3,237	54.0
O	221	0	0	87	0	0	9	31	92	0	2,158	36.0
P	129	2	0	130	0	20	25	0	80	2	2,020	33.7

PERCENT DISTRIBUTION OF TIME SPENT IN EACH OF THE 52 CATEGORIES

	CATEGORY												
Class	T10	T20	T30	T40	T50	T51	T52	T53	T54	T55	T56	T61	T62	T71
A	5.9	1.3	10.0	0.9	0.0	2.8	1.5	1.1	0.0	2.3	0.7	5.2	0.0	0.1
B	0.5	0.9	5.9	0.8	0.2	2.7	1.2	0.7	0.0	0.1	1.6	3.8	1.7	0.0
C	7.0	0.9	11.9	0.4	0.7	16.3	3.1	1.2	0.0	1.5	0.7	44.5	0.0	0.4
D	0.5	0.5	9.7	0.1	0.9	5.8	2.0	2.8	0.0	0.6	0.0	16.5	0.2	0.6
E	3.7	0.4	1.1	0.0	0.0	4.9	0.2	1.1	0.0	0.0	0.0	17.6	0.0	0.2
F	34.4	1.6	1.0	0.0	0.6	12.6	5.1	2.8	0.0	0.6	0.0	25.6	0.0	0.2
G	1.2	0.0	11.9	0.0	0.5	4.0	0.0	1.4	0.0	0.0	0.0	1.5	0.4	0.0
H	1.1	1.8	9.9	1.4	0.0	2.8	1.9	1.4	0.4	0.2	0.1	3.7	1.1	0.0
I	0.4	1.2	7.3	0.2	0.3	2.7	1.3	0.6	0.1	0.2	0.0	3.0	3.8	0.0
J	5.2	0.0	9.5	0.1	0.1	8.3	0.2	1.1	0.0	0.0	0.0	17.8	2.2	0.0
K	0.0	0.4	11.1	0.2	0.0	4.4	0.5	2.0	0.0	0.0	0.0	5.7	0.3	0.0
L	0.1	2.7	13.0	0.6	5.9	17.4	6.1	5.7	0.0	1.3	0.0	2.6	2.3	0.0
M	0.0	0.0	4.2	0.4	1.4	5.0	1.1	3.2	0.4	0.3	0.1	48.7	0.6	3.0
N	0.4	2.9	13.1	0.0	0.1	8.2	1.6	1.1	0.0	0.0	0.2	1.1	5.6	1.3
O	3.5	0.5	13.5	0.4	0.0	6.9	1.8	2.1	0.0	0.2	0.0	18.6	0.9	1.1
P	10.5	2.9	20.0	1.2	1.5	6.5	2.4	2.2	0.0	1.0	0.0	1.6	4.8	0.8
AVG	4.7	1.2	9.6	0.4	0.8	7.0	1.9	1.9	0.1	0.5	0.2	13.6	1.5	0.3

PERCENT DISTRIBUTION OF TIME SPENT IN EACH CATEGORY

Class	CATEGORY													
	T72	T73	T81	T82	T83	T91	T92	T93	T94	T95	T96	T97	S10	S20
A	0.0	0.1	3.4	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.9	0.0	0.2	0.2
B	0.0	0.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5	0.6
C	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.1
D	0.0	0.1	8.0	5.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0
E	0.0	0.0	1.7	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
F	0.0	1.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.4
G	0.0	0.5	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.5	0.4	0.0	0.9	0.3
H	0.0	2.5	1.8	0.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	1.3
I	0.0	0.4	3.9	0.0	0.0	1.4	0.2	0.5	0.0	0.0	0.2	0.0	0.3	1.2
J	0.0	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0
K	0.0	0.4	6.4	0.1	0.0	0.5	0.0	1.7	1.2	0.0	1.9	0.0	0.0	0.1
L	0.0	0.4	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
M	3.0	3.5	0.0	0.0	0.0	3.7	0.5	0.0	0.0	0.0	1.9	0.0	0.5	2.3
N	0.0	0.6	0.7	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
O	0.0	2.4	9.3	0.0	0.0	2.1	1.4	1.1	1.8	0.9	0.3	0.0	0.1	0.0
P	0.0	1.3	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
AVG	0.2	3.9	3.3	0.3	0.0	0.7	0.2	0.2	0.2	0.1	0.4	0.0	0.4	0.5

PERCENT DISTRIBUTION OF TIME SPENT IN EACH CATEGORY

	CATEGORY													
Class	S30	S40	S50	S51	S52	S53	S54	S55	S56	S61	S62	S71	S72	S73
A	0.5	0.2	0.0	0.0	1.1	0.7	0.2	0.8	11.9	12.0	0.8	0.0	0.0	0.6
B	1.8	0.0	0.0	0.3	2.2	1.4	0.3	1.0	7.4	3.8	0.0	0.0	0.0	1.3
C	0.0	0.0	0.0	0.1	0.1	0.3	0.2	0.4	0.3	1.8	0.0	0.2	0.0	0.0
D	0.0	0.0	0.0	0.3	0.4	0.3	0.1	0.1	0.2	1.7	0.0	0.0	0.0	1.1
E	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.9	0.0	5.8	0.0	0.0
F	0.0	0.0	0.8	0.2	0.1	0.6	0.2	0.0	2.4	7.0	0.0	0.5	0.0	1.0
G	3.1	0.0	0.0	0.7	1.1	0.1	0.1	0.3	2.5	20.8	0.6	0.0	0.0	0.9
H	0.5	0.1	0.0	0.0	2.1	0.9	0.2	0.0	0.6	14.7	0.0	0.8	0.0	1.8
I	3.4	0.7	0.0	0.9	3.3	0.3	0.1	0.5	0.3	8.4	0.2	0.3	0.0	3.4
J	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	23.0	0.0	0.2	0.0	0.0
K	0.0	0.0	0.0	0.0	2.3	0.7	0.0	0.0	0.7	2.0	0.0	0.0	0.0	0.6
L	0.0	0.0	0.0	0.8	0.4	0.6	0.2	0.0	1.1	1.3	0.0	0.0	0.0	0.7
M	2.7	0.0	0.1	1.0	0.3	0.1	0.0	1.2	1.1	0.0	0.0	0.0	0.0	0.0
N	0.8	0.0	0.0	0.2	0.6	0.2	2.4	0.0	6.2	2.3	0.0	3.3	0.0	0.7
O	0.4	0.0	0.1	0.0	0.1	0.3	0.3	0.0	0.0	4.7	0.0	1.2	0.0	0.3
P	0.1	0.0	0.0	0.4	0.5	0.8	1.3	0.8	1.9	7.6	0.9	1.1	0.0	1.0
AVG	0.8	0.1	0.1	0.3	0.9	0.5	0.4	0.3	2.3	10.6	0.1	0.8	0.0	0.8

PERCENT DISTRIBUTION OF TIME SPENT IN EACH CATEGORY

	CATEGORY												
Class	S81	S82	S83	S91	S92	S93	S94	S95	S96	S97	% Total Teacher	% Total Student	% Total
A	21.1	0.0	0.0	3.1	0.0	0.9	0.0	0.1	3.6	0.0	37.9	60.1	98.0
B	36.8	0.5	0.0	3.2	0.2	6.3	0.9	0.2	4.4	0.1	23.9	75.2	99.1
C	2.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	92.8	6.6	99.4
D	27.2	0.6	0.1	0.1	0.0	1.3	2.2	0.4	10.8	0.0	50.8	48.0	98.8
E	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.4	65.1	99.5
F	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.8	14.9	100.7
G	25.2	3.7	0.0	3.2	0.9	0.0	0.3	0.8	7.0	0.0	24.3	74.2	98.5
H	16.4	0.3	0.4	11.3	0.0	0.1	0.0	2.0	5.2	0.1	33.3	64.2	97.5
I	23.9	5.9	0.1	7.1	2.6	0.5	0.8	0.6	3.9	0.1	28.5	70.2	98.7
J	13.8	0.0	0.0	4.2	0.2	0.0	0.0	0.0	6.4	0.0	51.2	48.4	99.6
K	25.2	0.0	0.1	9.6	2.4	0.7	0.0	0.0	14.8	0.0	38.4	60.3	98.7
L	10.4	0.1	0.0	3.8	0.0	0.0	0.0	0.2	11.8	0.0	66.0	32.5	98.5
M	5.4	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.6	0.0	82.3	16.4	98.7
N	24.9	0.0	0.0	4.1	0.0	1.0	0.0	0.4	13.5	0.0	38.1	61.2	99.3
O	10.1	0.0	0.0	4.1	0.0	0.0	0.4	1.4	4.2	0.0	70.4	28.3	98.7
P	6.1	0.0	0.0	6.2	0.0	0.9	1.1	0.0	3.8	0.0	60.3	36.6	96.9
AVG	15.1	0.7	0.0	3.8	0.4	0.7	0.4	0.4	5.6	0.0	51.2	47.6	98.8

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